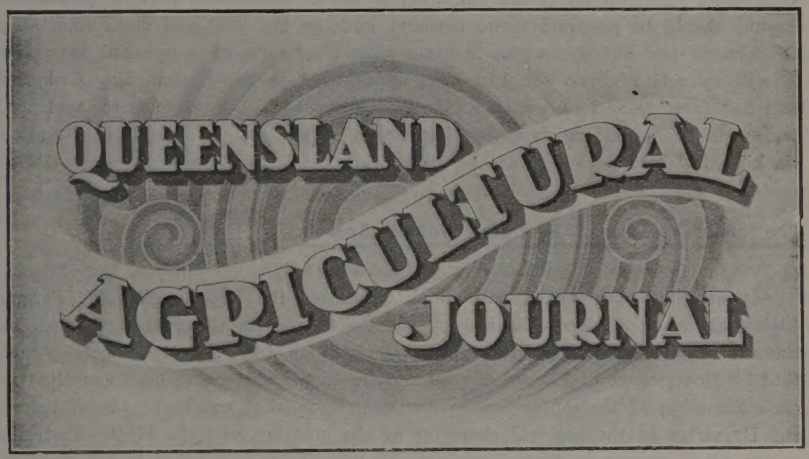
ANNUAL RATES OF SUBSCRIPTION.

Farmers, Graziers, Horticulturists, and Schools of Arts, One Shilling. Members of Agricultural Societies, Five Shillings, including postage. General Public, Ten Shillings, including postage.



VOL. XXXVIII. 1 AUGUST, 1932. PART 2

Event and Comment.

Country Life—The Dignity of Labour.

ADDRESSING the undergraduates of the Queensland University recently, His Excellency the Governor, Sir Leslie Orme Wilson, laid great stress on the responsibilities of democracy and the dignity of labour. He said he had some personal knowledge of the University of Reading—the youngest university in England—and of the University of Bombay, of which he had been Chancellor. At Reading the undergraduates took little interest in politics beyond their connection with debating societies and political clubs, but at Bombay the students were politicians from the time they entered the university, and most of their actions were based on political ideals. It had been said that in Queensland there was a desire on the part of the undergraduates to become clerks or to go into the professions, because it was felt that they might lose status in society if they did not follow that line. That touched the whole question of democracy, particularly in a country like Queensland, where so much wealth came from the land. The truest democracy in the world was to be found in Great Britain, where democracy was defined as a form of representative government under which the people elected those who were to govern them on their behalf. Great Britain had built up its democracy steadily—it was not a mushroom growth of a night. The British Parliament was the mother of Parliaments—it had pursued its methods of procedure and its work in accordance with the progressive views of the British public. So democracy could only advance, in Tennyson's words, "by freedom slowly broadening down, from precedent to precedent." That was what was happening in England to-day. India was an older country that Britain—perhaps the oldest civilisation in the world—but India had been governed for many years under an autocracy. While every one was desirous of seeing India becoming a self-governing democracy, that could only be done by a gradual broadening down as in England.

There could be no democratic state in the world unless the dignity of labour was recognised. There could be no question of any one being looked down upon because he rolled up his sleeves and went to work. He took it that in Queensland anyone should be prepared to go out and work on the land and make something for himself and not use a pen in some office. Introducing a personal note, His Excellency said his own son had been apprenticed to the Hudson Bay Company and had farmed the land with a six-horse plough; he had since come to Australia, had gone on a training farm in New South Wales, and was now on a station learning his job.

The Sugar Agreement—Premier's Notable Speech.

"So far as the Queensland Government is concerned, as one party to the contract, the Sugar Agreement will stand," declared the Premier, Mr. W. Forgan Smith, at the conference convened by the Commonwealth Government to consider the affairs of the sugar industry in Brisbane on 27th July. At the outset, he said that his Government had in no way, as a party to the agreement, been consulted in the summoning of the conference, or on the business that was to be placed before it. By virtue of the national character of the industry, and the White Australia policy, all Governments, both Commonwealth and State, had found it necessary to adopt a very definite policy towards the industry, and in consequence it could not be assumed to be in the same category as any other industry. There were particular features associated with it that were essential to the welfare and development of the Commonwealth.

After reviewing the findings of the Committee of Inquiry, which had recommended, among other things, the renewal of the embargo on imported sugar for five years, and the maintenance of the existing prices for three years. Mr. Forgan Smith said that the existing agreement also provided in those clauses relating to the constitution of "Trust Accounts" that when sufficient credits had accrued therein such savings should be passed on to the Australian consumers. So far as the average price per ton for raw sugar was concerned, the average of the years 1927, 1928, and 1929 was £21 1s. 4d. per ton, but during last season, 1931, the average price was £18 6s. per ton. The export surplus was not a small factor in maintaining the Commonwealth's favourable trade balance overseas.

The Premier emphasised the volume of interstate imports into Queensland, stating that for the twelve months ended 31st December, 1931, these totalled £11,332,617 (excluding stock and wool overland). Exports to other States from Queensland for the same period totalled £9,986,165, of which the value of sugar was £6,144,610 (excluding stock and wool overland). It would be seen that about one-quarter of the purchases were due to sugar, and that without sugar the trade would be very unbalanced. "It must be borne in mind," said Mr. Smith, "that the throwing out of one worker, for instance, in the sugar industry, by reducing export, would carry in its train the throwing out of possibly two others as a corollary."

Mr. Smith referred to the special monetary grants to other States, and said that, in addition, they must take into consideration the bounty on wines, dried fruits, wheat, and specially protected tariff advantages to manufacturing industries in the South. "Queensland citizens accept their quota of obligation in such matters without complaint," said the Premier.

The restoration of parity between costs and prices was being generally recognised as a matter of urgency and as part of any scheme of reconstruction in industry, and the increase in the price levels was the only means through which trade recovery could take place. That elementary principle was being recognised at Ottawa. "It seems to me extraordinary," pursued Mr. Smith, "that whereas the Ottawa Conference is considering the raising of price levels, we should be having a conference here at which we are asked to reduce price levels." If this contract was to be reviewed in the manner suggested, it would, without doubt, seriously affect the revenue. It would affect the volume of employment, and it would affect the purchasing power of those engaged in the industries of Queensland. The Queensland Government had honoured the agreement executed between the two Governments, and the Moore Government had already issued the proclamation acquiring the 1932 crop under the conditions laid down in that agreement. Costs had already been incurred in connection with the ensuing crop now being harvested, and bank advances had been made on the basis of the agreement referred to. "Having regard, therefore, to all the circumstances," said the Premier in conclusion, "my Government takes the view that the agreement which was entered into after complete and exhaustive inquiry should be honoured by both Governments in its entirety, and that the conditions of the industry should not be in any way disturbed."

Science and the Grazing Industry.

SPEAKING at the formal handing over of the new research laboratory at the Brisbane Abattoir, the Minister for Agriculture and Stock said that the Council of Scientific and Industrial Research had his sympathetic support in their efforts to solve some of the problems of rural industry. He was not insensible to the responsibilities that had been placed on the Government by the establishment of the laboratory, in which the problems of the men in the West and in the North would be solved. What would become of vast areas in the North and West if the cattle and sheep industries failed? The problems of this and other industries were becoming greater and more pressing as time went on. It had been a statesmanlike thought which had prompted the establishment of the Council of Scientific and Industrial Research, and it was a matter of wonder that there were not more liberal contributions to the cost of its work. The old days of haphazard effort were gone, and the period of scientific research was upon us. There were problems enough and to spare to be tackled. We had wondered long enough about these problems of export meat, and this was the first consistent effort made to determine why we were not capturing all the trade we should. If the laboratory achieved a solution of that, and that alone, it would have justified its establishment.

Mr. Bulcock went on to praise the work being done in the laboratory in North Queensland, and said that the Council of Scientific and Industrial Research had a great and definite mission. The influence of this new laboratory would radiate to the smallest cattle-owner in the West. The utmost resources of his department, he promised, would be at the disposal of the Council in the legitimate prosecution of its great work. He thought that there ought to be more co-operation between his department and the Council, and it was with that object in view that he had asked Professor Richards to become chairman of the committee controlling the new experimental station at Yeerongpilly. That new station dealt with another all-important phase of the meat industry; for it aimed at the raising of healthy cattle.

THE HON. FRANK W. BULCOCK.

MINISTER FOR AGRICULTURE AND STOCK.

THE Hon. Frank W. Bulcock, Minister for Agriculture and Stock in the new Queensland Government, has had a lifelong association with rural industry and its problems. He was born at Mount Arapilis, Victoria, where his parents farmed successfully an irrigation area. His early education was obtained at the Newtown Superior Public School, Sydney. Completing his primary tuition, he entered the Sydney Technical College as a student, where he took the agricultural course and graduated with first class honours. Veterinary science next claimed his attention, and afterwards he succeeded in winning an agricultural bursary, of which only nine were then available annually in New South Wales. He selected the Wagga Agricultural College and Experimental Farm for further training in agriculture and animal husbandry, and there won added distinction as a student, achieving in his term the position of dux of the College and taking honours in bacteriology, plant diseases, dairy practice, and sheep and wool. In the semi-final examinations he obtained the remarkable average of 91 per cent. in agricultural science, and later secured an excellent pass in veterinary science. On leaving Wagga he devoted his attention to plant breeding with a special bias towards wheat, working on different farms in the Riverina with the object of gaining further field experience. Plant breeding has continued an absorbing interest with Mr. Bulcock, notwithstanding the demands of a strenuous parliamentary career.

Coming to Queensland he quickly found an outlet for his energies in the pastoral industry. Like many other young Australians who have made their mark in public life, he was impatient with the social inequalities of the day. Joining the Australian Workers' Union, perhaps the greatest of our industrial organisations, he soon became prominent in its councils, and, winning the confidence of its members, was elected to an important official position. The Union movement, wisely governed, provides an excellent training in the qualities needed in public life, and to Mr. Bulcock the years spent in active association with the A.W.U.—an organisation of competent direction, high standing, essentially all Australian in its outlook, and unweighted with narrow provincial or sectional prejudice—were invaluable. He was thus brought into direct and vigorous contact with men and affairs, and that experience has helped him immensely in his career as a representative of the people.

When the Barcoo seat in the State House became vacant on the entry of the late Hon. T. J. Ryan, a former Premier of Queensland, into the Commonwealth Parliament in 1919, Mr. Bulcock was selected for the ensuing contest, which he won with a substantial majority. At the general election of 1920 he retained the seat without difficulty, and at the four subsequent triennial appeals to the people he was accorded the distinction, like his predecessor in office, Mr. Harry F. Walker, of being returned unopposed.

In the course of his parliamentary career Mr. Bulcock has made a special study of agricultural and land laws, and rural economy generally. As chairman of the Parliamentary Agricultural Committee in successive Parliaments, he has had a shaping hand in legislation designed to make the farmer corporately articulate, and to give him a firmer control of the disposal of his products and a fairer share of the profits of his industry. Conditions at the time called for a fresh, broad survey of country life and its problems, a greater appreciation of the difficulties that beset Queensland's basic industry, and a more definite sense of direction in respect to its fullest development, economically and otherwise. It was then becoming more widely recognised that the fostering of the agricultural industry, on which present prosperity is based and our future must be built, demanded the attention of the best minds of the Commonwealth, and to that end farmers themselves must be given an opportunity of contributing their quota of brains and energy. The field of rural organisation was cleared and widened, new furrows opened, the machinery delivered on the ground, and into the hands of the farmers of Queensland was placed their own industrial destiny. In all that legislative planning a sound practical knowledge of agriculture and its economic and other problems, in all their complexity and perplexity, was a recognised essential. Mr. Bulcock's share in it was of no small measure. He remains convinced that the prosperity of Queensland depends on a vigorous land settlement and a sound agricultural programme.

As a debater Mr. Bulcock has earned a deservedly high reputation in the House. Obviously an earnest student of public questions, he has a happy knack of classifying and marshalling his facts and arguments in orderly sequence and presenting them clearly, logically, and convincingly, and with a natural courtesy that takes all the sting out of any antagonism that might be aroused in the minds of those championing opposing schools of thought. "Hansard" records show that many notable contributions

PLATE 30.

HON. FRANK W. BULCOCK, MINISTER FOR AGRICULTURE AND STOCK.

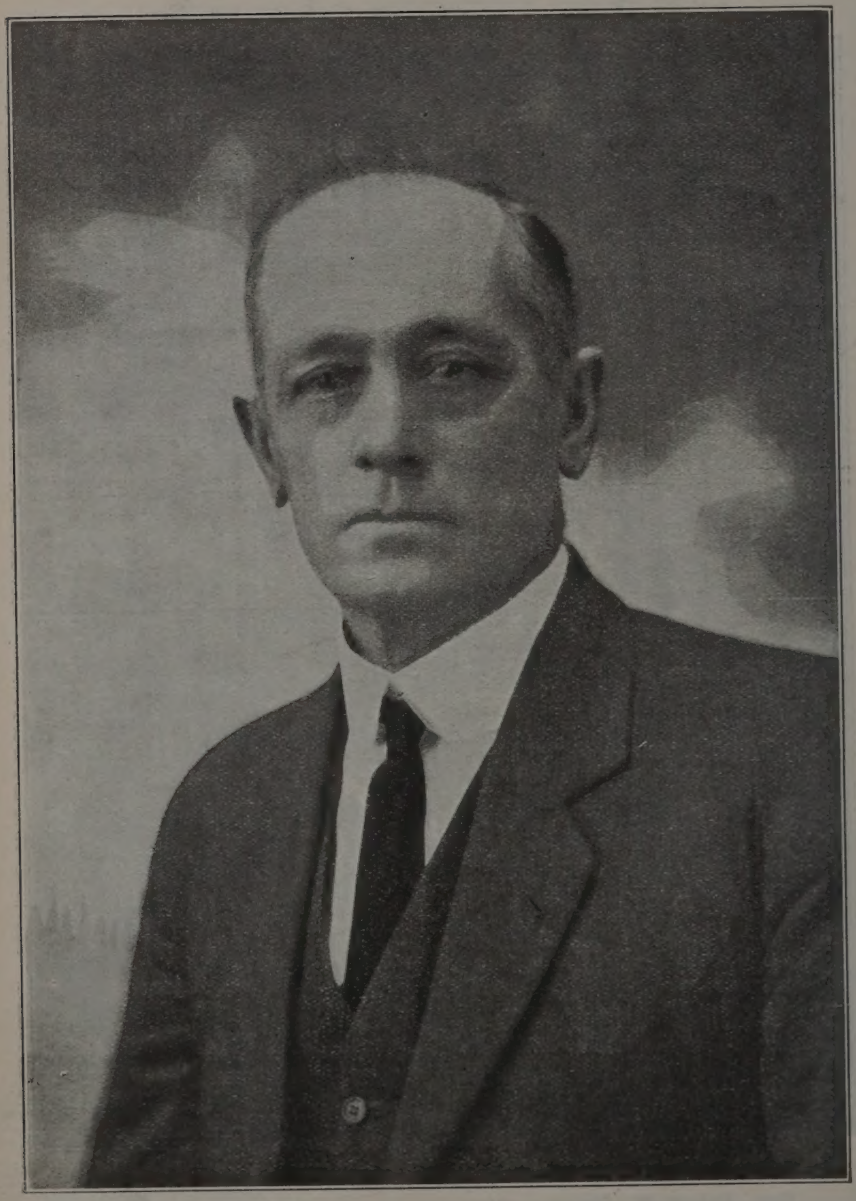


PLATE 31.

HON. HARRY F. WALKER, formerly Minister for Agriculture and Stock, and representative of Cooroora in the Legislative Assembly.

to discussion on rural economics and related subjects have been made by Mr. Bulcock, and that his speeches in Parliament are marked by the rather unusual quality of reading well even long after the favourable impression produced at their hearing—the pleasant influence of the well-spoken word—has been effaced. His rare appeals to sentiment have been based always on the Australian doctrine of a fair deal and the decent thing in all human relationships. Like most Western men, he is an apostle of the constructive idea, a fighter for true national ideals, yet with eyes wide open to realities.

Mr. Bulcock's home is at Corinda. He is chairman of the local State School Committee, and a member of the executive of the Queensland Ambulance Transport Brigade. Reading, tennis, fishing, and experimental work—chiefly with pecan and Australian nuts and the tung oil tree—occupy his hours of limited leisure.

VALEDICTORY.

RETIREMENT OF THE HON. HARRY F. WALKER.

ON the occasion of his relinquishing the office of Minister for Agriculture and Stock, which he had held with distinction for three years, Mr. Harry F. Walker invited the whole of the headquarters staff of the Department to meet him for the purpose of bidding them farewell and of introducing his successor, Mr. Frank W. Bulcock.

In the course of a brief valedictory address Mr. Walker paid a generous tribute to his former officers for their capable and loyal service during the term of his occupancy of the ministerial chair. He assured them of a continuance of a personal interest in their welfare and in their official activities. He, like his predecessor, Mr. Forgan Smith, had always regarded the Department of Agriculture and Stock as the most important in the State, and believed that his successor, Mr. Bulcock, held the same view. He had always observed a spirit of healthy co-operation among his officers with the people on the land, a spirit which he had done his best to foster and which he knew would continue under Mr. Bulcock's guidance.

The scientific and technical branches had for him an especial interest, and he felt a pride in his association with them, as well as with the work of the administrative staff, which had established a very high standard of efficient public service.

In introducing his successor, Mr. Bulcock, Mr. Walker referred feelingly to the personal friendship that existed between them, and congratulated him most heartily on his accession to office.

Mr. Bulcock replied briefly, and in the course of happily phrased remarks expressed pleasure at meeting the officers of the Department, paid a warm tribute to his predecessor's fine personal qualities, and congratulated him on the success he had achieved in office, which he hoped, with the co-operation of all concerned, to emulate.

At the request of those assembled, Mr. Bulcock presented Mr. Walker with several gifts, including one for Mrs. Walker, as tangible evidence of their appreciation of him as their chief and also as a man; as well as an expression of a desire for him to have in his home at Tewantin some little reminder of his long association with the Department and its officers. To the presentations were added sincere wishes for a long life of health and happiness for both Mr. and Mrs. Walker.

Further valedictory speeches, expressing the personal sentiments of all present, were made by Messrs. E. Graham (Under Secretary), H. T. Easterby (Director of the Bureau of Sugar Experiment Stations), and H. C. Quodling (General Manager of the Agricultural Bank).

Mr. Walker then thanked each officer individually for services rendered to the Department during the term of his control. While Minister for Agriculture and Stock Mr. Walker was responsible for the following measures, all of which have had a beneficial influence on country life and industry and the general welfare of the people of Queensland:—The Banana Industry Protection Act; Native Plants Protection Act; Soil Survey Act; and amendments of the Primary Producers' Organisation and Marketing Act, Wheat Pool Act, Fruit Marketing Organisation Act, Agricultural Bank Act, Diseases in Stock Act, Diseases in Plants Act, and Margarine Act.

THE QUEENSLAND SUGAR INDUSTRY.

By H. T. EASTERBY, Director, Bureau of Sugar Experiment Stations.

PART XXVIII—continued.

Farm Machinery—(B) Cane Harvesters—continued.

IN recent years the idea of cutting cane by machinery has been more strongly developed, and an earnest effort has been made to solve the problem. It is now more probable that this important invention may be satisfactorily realised.

The Falkiner Cane Harvester.

As mentioned in the preceding article, the basis of this machine was the Hurrey Harvester, invented and built many years ago, and which was demonstrated first about 1910, and then at intervals, the last being at Sarina under the auspices of the Australian Sugar Producers' Association in August, 1921. Mr. Hurrey, I understand, was an old canegrower himself, but apparently he did not possess sufficient capital to fully develop the machine.

Mr. R. S. Falkiner, a Victorian, primarily associated with pastoral interests in Australia, became interested in the Hurrey machine, and saw in it the germ which his personal mechanical skill and his command of money would enable him to develop. He, with an engineer, Mr. W. G. Charley, set about improving the machine, and in 1924 the Falkiner Cane Harvester was first tried out at Qunaba Plantation. A report from the Sugar Experiment Station, Bundaberg, in September, 1924, stated:—

> "The principle of working is altogether new and entirely different from any previous machine, the knives operating in front do very good work, cutting level with the ground or slightly under, if required. Before coming to the knife the cane is gathered by two long arms, is cut and carried by an endless chain with fingers attached onto an elevator or carrier, top first, the top is then caught between two pneumatic rollers, and the stick passing through these at a great speed is thrown to the back of the machine, about 6 feet. The top then striking a board forcibly drops on two revolving knives, is removed and ejected, while the stick falls on two other pneumatic rollers and is dropped into a hopper at the bottom.
>
> "With regard to the work of the machine, there are various improvements required before it will really be a commercial success. The topping of cane having tops of different lengths is one big difficulty, and arrowed cane presents another.
>
> "The machine is not designed at present to cut green or tangled cane.
>
> "When seen at work the Harvester was working in a 12-ton per acre crop, and was cutting at the rate of 6 tons per hour, but with more power it could easily double that."

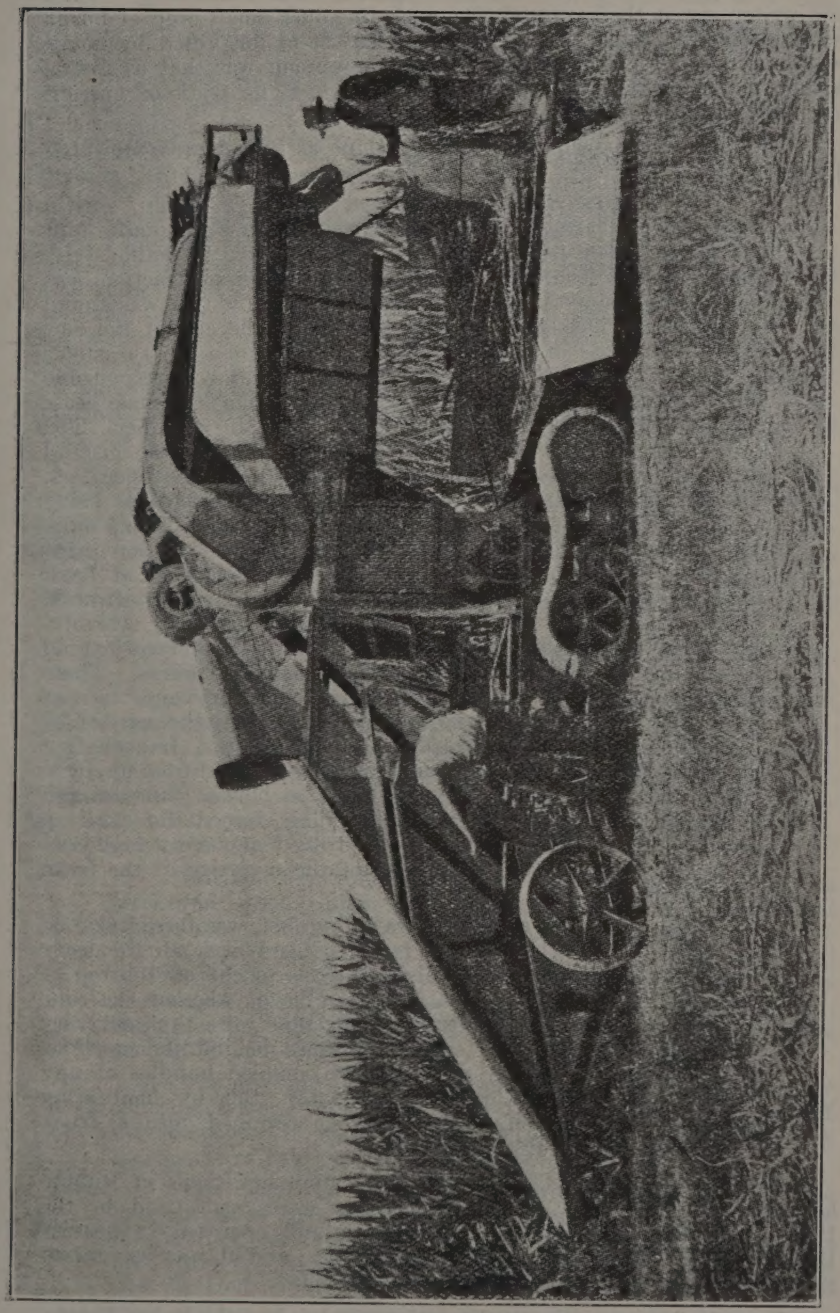


PLATE 32.—THE FALKINER CANE HARVESTER (QUEENSLAND MODEL) IN 1925.

In the year 1925 the machine was again tried at Bundaberg. When the writer saw it the harvester was operating in a small crop of burnt straight-standing cane. At that time it was being inspected by many well-known sugar men, and the general impression was that as far as operating in burnt straight cane was concerned the work of cutting was well done.

The following description of the machine as it then was, appeared in the press:—

> "Its motive power was derived from two 20-h.p. Austin engines using kerosene, their fuel consumption being half-a-pint per horse power per hour, or, in other words, 2½ gallons per hour for both engines. The caterpillar type of traction was decided upon by the inventor, but the regular style was found to be useless, inasmuch as when turning at the end of the row the square edges of the plate were found to tear up the stools of cane. To obviate this was a necessity, and was responsible for the introduction of an ingenious system of snake-scale bevelled-edge overlapping treads designed by Mr. Falkiner. The knives cut the cane at any desired depth beneath the ground surface, being raised or lowered at the will of the operators. The knives were almost oblong in shape, their dimensions being about 18 inches by 7 inches, sharpened at the short ends only, each working on its own shaft with an outward motion overlapping about 1 inch; and no trouble was experienced from stones up to 6 inches in diameter as they were thrown outwards. The cane was drawn into the mouth of the harvester by a revolving chain rake, being then cut by the knives referred to and carried up the elevator between two pneumatic rollers. These rollers were inflated, and revolved at such a very high rate of speed that each stalk of cane was projected after the manner of a spear being thrown towards the baffle plate. Immediately after the cane left the pneumatic rollers it was lifted up by a 12-h.p. power air blast obtained from a blower fan through a pipe to four jets. This powerful blast forced the cane up against inflated rollers which also revolved at a very high rate of speed, stripping the burnt cane of the majority of the trash attached to it.
>
> "The top of the cane, still travelling fast, was forced against the baffle plate with sufficient force to bend back all the leafy tops and permit the two revolving knives to cut off the top of the stalk at the correct point, irrespective of whether the cane were 2 feet or 14 feet in length. The tops were thus cut very uniformly. The severed top was dropped behind the machine, and the cane fell into a carrier which enabled bundles of any desired size to be dropped systematically, thereby facilitating loading. The cut cane could also be dropped into a truck running alongside the machine."

From the experiences gained in the preliminary trials at Bundaberg further alterations and improvements were made, and in the 1926 season the machine was taken North and operated in heavier Badila crops. This disclosed other weaknesses, and it was recognised that there were still many difficulties to surmount.

Later in the same year the harvester was tried at the Palms Estate, Mackay, but it again developed various faults. The topping was not

satisfactory. When the machine was tried in green cane it became choked after going about 20 feet. Objections were registered as to its size, it requiring about a 30-feet headland in which to turn.

In the 1927 season the machine was again tested. It was reported that the ground cutting was good in level patches, but only fair in uneven places. The paddock it was tried in at Te Kowai, Mackay, was rather broken and the soil lumpy. The topping done was described as only medium. The trial was marked by much mechanical trouble

A company known as the Queensland Cane Harvesting Corporation, Limited, was formed to control the Australian rights of this machine in December, 1925. The directors comprised a number of well-known men in the industry, and many of the mills (more particularly in North Queensland, took shares. Mr. R. Muir (now on the staff of the Queensland Cane Growers' Council) who was at that time associated with the above company informs me that the number of machines made in Australia totalled six. Five of them were made in Queensland by Messrs. Evans, Deakin, and Company, and one was manufactured in Melbourne by the company itself.

Demonstrations ceased in Australia about November, 1927, and about that time it became generally understood that the Falkiner machine would be taken to Cuba to be developed. For some time after this date little was heard of it. In 1930, however, a cablegram appeared in the Brisbane "Courier" that Mr. Falkiner had sold a half interest in the harvester to the Punta Alegre Sugar Company, of America, and that the Dahlberg Company, of America, had taken an exclusive license for the harvester covering the American Continent. It was subsequently stated in March of 1931 that, with the help of American engineers, minor defects had been eliminated, and that a much lighter and considerably less expensive model had been evolved. An American company had been formed for its manufacture, and a Cuban order had been placed for about twenty of the machines. The machine was tested in Florida in March, 1931, and the following account of its operations was given in the American Sugar Journal, "Facts about Sugar":—

> "For the first time in the history of the sugar industry a cane crop is being taken off this season by the use of mechanical harvesters. This epoch-making proceeding is taking place at Clewiston, Florida, where the Southern Sugar Company, up to the middle of February, had harvested over 20,000 tons by mechanical means under conditions of unusual difficulty resulting from the tangled state of the cane and the softness of the ground in consequence of heavy and protracted rains.
>
> "The machine that is performing this work is the Falkiner cane harvester, which has been twenty years in process of development. It originated in Australia, and was improved as the results of field tests in Cuba and Florida.
>
> "The man responsible for the practical realisation of the long-cherished dream of a mechanical cane harvester is Ralph S. Falkiner, an Australian, who, curiously enough, never has been directly engaged in the sugar industry. His attention was directed to the possibility of applying power to the task of cane cutting by a Queensland canegrower who had been experimenting with the problem. Mr. Falkiner extended financial

support to the originator of the idea, and after the death of the latter continued the work of development, subsequently associating with himself a capable mechanical expert, W. G. Charley.

"Up to 1929 one of the most obstinate difficulties encountered by the builders of harvesting machines was that of topping the cane at exactly the right point. In the 1930 model of the Falkiner harvester this problem was eliminated by incorporating a device for cutting the entire stalk into short lengths and passing these through a cylindrical chamber from which a strong current of air carries off the light material, including leaves, tops, and trash, and spreads it over the ground from which the cane has been cut, while the sections of the cut-up stalks are conveyed by an elevator to a truck or tractor-driven cart travelling alongside the harvester.

"Another departure from earlier practice in designing the recent models of the harvester is the equipment of the machine with a broad fender which pushes the standing cane forward to an angle of about 45 degrees before the stalk is severed, at or slightly below the surface, by revolving disc knives. The butts of the stalks are seized by the revolving fingers of the conveying elevators and are drawn into the machine. In this way canes that lie flat upon the ground, as well as crooked or curving stalks, are cut as efficiently as those that stand upright. Two circular discs placed vertically on the outer sides of the fender cut any canes that lie horizontally across the rows, and the portions of these stalks left behind on one trip across the field are taken up on the next trip.

"The double elevators gather the cane and trash and pass it along to chopping knives which cut the mass into sections 4 to 6 inches in length. These are carried to the separating drum where the trash is winnowed out. What Mr. Falkiner describes as the 'push-over' method of cutting the cane and taking it into the machine, and the system of separating the trash from the stalks by a strong air current are the two most important innovations in transforming the harvester from a hopeful experiment to a commercially practical machine.

"The 1930 model of the harvester was tried out in Cuba and later in Florida during the past season's harvest, and its performance was so satisfactory that orders for fourteen machines were placed by the Southern Sugar Company, while six others were ordered for shipment to Cuba. These machines were built by the Allis-Chambers Manufacturing Company at Milwaukee, U.S.A."

Later, namely, in February, 1932, "The Cuba Review" stated:—

"During last season the cost of hand labour was exceedingly low, and there is a probability that wages will be as low or lower during the coming harvest. On the basis of such wages it is said that the harvester cannot be operated economically, but as conditions improve and the price of labour rises from the abnormally low levels which prevail to-day, the harvester can undoubtedly be used at a considerable saving in the cost of producing sugar. In any event, opinions have been expressed that within a relatively short time the harvester will come into more general use throughout Cuba."

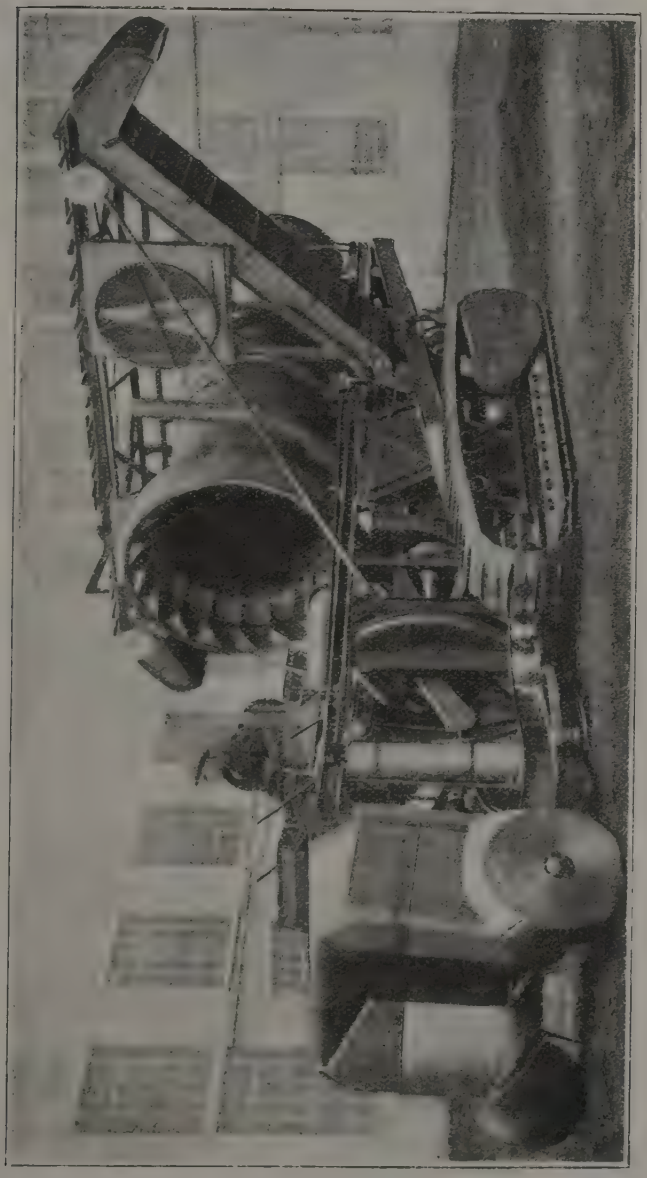


Plate 33.—The Falkiner Cane Harvester, Latest Model, now Working in Florida.

The Australian company has, I understand, no interest in the American rights. Further information regarding this harvester will be available later on, after the next annual meeting of the Australian company.

The Falkiner Company were rather unlucky, inasmuch as one machine was destroyed by fire in Queensland and another was washed overboard into the sea and lost somewhere off the coast of America.

Mr. A. F. Bell, the Pathologist to the Bureau of Sugar Experiment Stations, who was recently on the other side of the world as a delegate to the International Society of Sugar Cane Technologists, stated on his return to Australia:—

> "The Falkiner cane harvester is operating in Florida, but reports as to its efficiency were not altogether favourable. In order to facilitate the removal of the trash by means of a forced blast of air, the cane was being cut up into lengths of about 1 foot or less, and a considerable amount of cane was blown out also. One delegate reported that he had made an estimate of the amount of cane lost in this manner, and computed it to be in the region of 10 per cent."

In a report mentioned in the proceedings of the fifty-first annual meeting of the Hawaiian Sugar Planters' Association, Mr. J. Meinecks stated that three machines in Cuba had not been uncrated, due to the fact that the Cuban Government threatened to tax each machine 100,000 dollars.

Miller-Owen Cane Harvester.

This machine was invented in Mackay about the year 1926, and was practically financed by a Mackay company formed about 1927. It was on a much lighter and compact basis than the Falkiner harvester, and it was hoped that as it would cut from 5 to 10 tons per hour it would be particularly suitable for each farmer with a moderate crop to purchase one of his own. The estimated working costs were given in the prospectus as follows:—

	Based on 5 tons per hour.	Based on 10 tons per hour.
	s. d.	*s. d.*
Operator per ton	0 6	0 3
Oil and fuel	0 3	0 3
Maintenance	0 2	0 2
Loading	1 6	1 6
Machine and other charges ..	2 0	2 0
	4 5	4 2

The dimensions of the harvester were given as—Length 15 feet, height 7 feet 9 inches, width 9 feet 6 inches, three-wheel suspension, two-wheel drive, and in transportation the machine could be moved from point to point under its own power. The cane stools were cut on top of the root system, the cutting knives (which were of the revolving type) severing the cane clean and levelling the soil and sealing the cut stool. The cane was to be topped by a simple method and the cane deposited in a carrier which automatically emptied, leaving the cane in bundles as desired ready for loading. A picture of this harvester is given below.

PLATE 34.—MILLER-OWEN CANE HARVESTER.
The Harvester in Operation.

During the past four or five years demonstrations have been given of the working of this machine, and it developed a good deal of promise towards solving the problems. Numerous improvements have been introduced from time to time to give greater strength and efficiency.

Further experiments with this machine are at the time of writing held up for want of funds, and the company has been wound-up compulsorily.

The Howard Cane Harvester.

This machine has also been introduced during the past few years, and was designed by Mr. A. C. Howard, and manufactured by the Austral Auto Cultivator Company, of Northmead, Sydney. It was reported to cut at a faster rate than the Miller-Owen machine mentioned above.

The following is an early description of this harvester:—

"The harvester consists of a cutting apparatus situated on the side of the tractor and extending forward to about opposite the front wheels. A chain conveyor connects the cutting apparatus with a roller table situated immediately behind the rear wheels of the tractor.

"The standing cane is cut by two revolving discs. The butts of the cane are then gripped firmly between two serrated-edged conveyor chains and carried rearwardly at a fast speed to a roller table. This pulls the cane down to a horizontal position ready to enter between the rollers.

"The roller table consists of three sets of spiral-fluted rollers. The first set of rollers receive the cane from the conveyor and carry it rearwardly until the heads clear the first set of rollers and at the same time it is carried crosswise by the spiral flutes on the rollers and passed on to the second set of rollers. These revolve in a forward direction, and the front bottom rollers are slightly higher than the others. These rollers carry the cane forward until the heads pass over the front roller to where it joins the cane. The cane being too stiff to bend up over the roller forms a short kink at the end of the cane; this holds the cane from going forward. It stays in this position till it is carried crosswise by the spiral flutes on the rollers and comes in contact with a rotary knife which cuts the heads off. The cane then passes on to a third set of rollers which carry it rearwardly, passing between two rotary brushes designed to take off the leaves and scale from the cane. It then passes out of the back of the machine into a trailer or a dumping rack, as required.

"The tops and leaves are conveyed to a chaff-cutting apparatus situated on the machine and cut into short lengths so that it can be easily worked into the ground for green manure.

"A blower is placed on the side of the machine which directs a blast of air to a point near the topping knife, and which blows trash and dirt clear of the hopper."

It has been stated that the harvester travels at the rate of ¾ of a mile per hour, and cuts 9 tons per hour.

According to a report made to the Bureau of Sugar Experiment Stations in 1931 this harvester cut burnt small cane averaging about 12

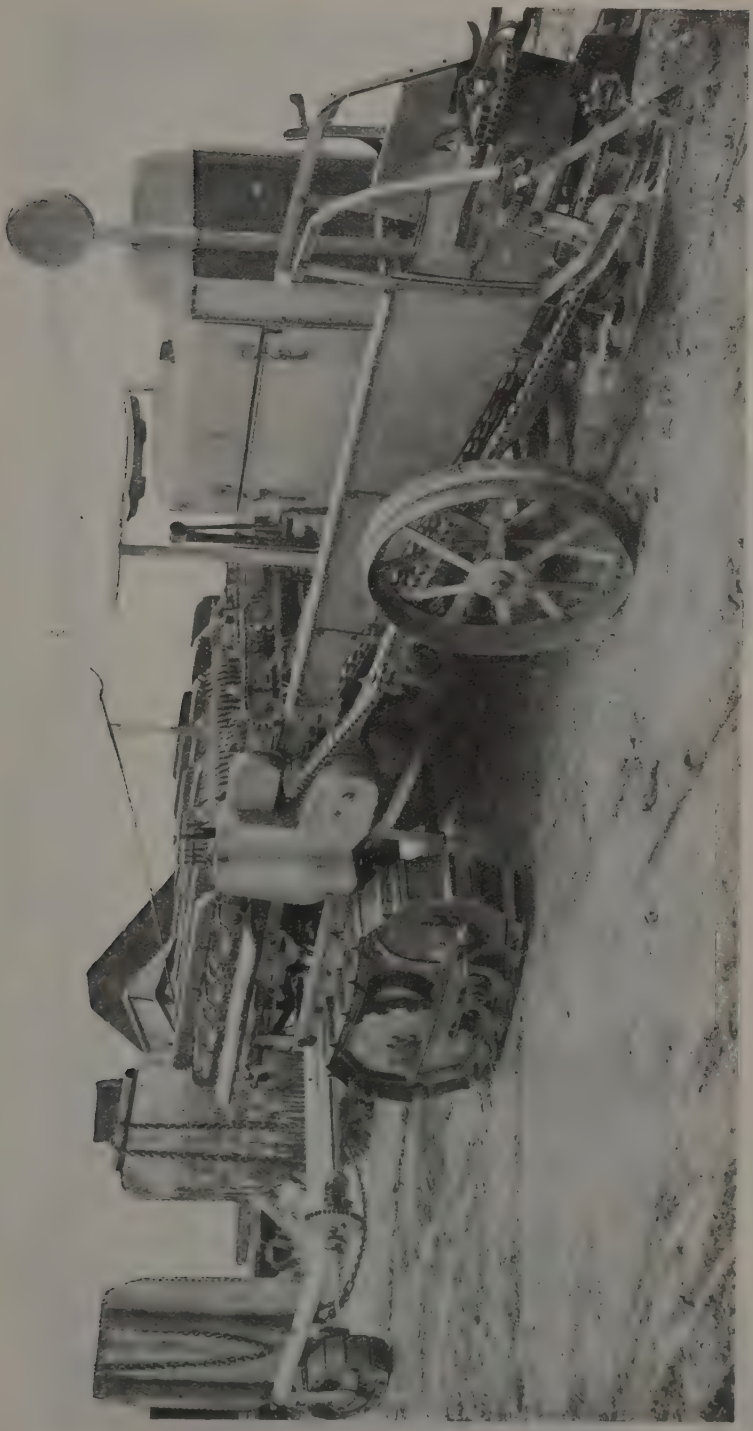


Plate 35.—Howard Cane Harvester.

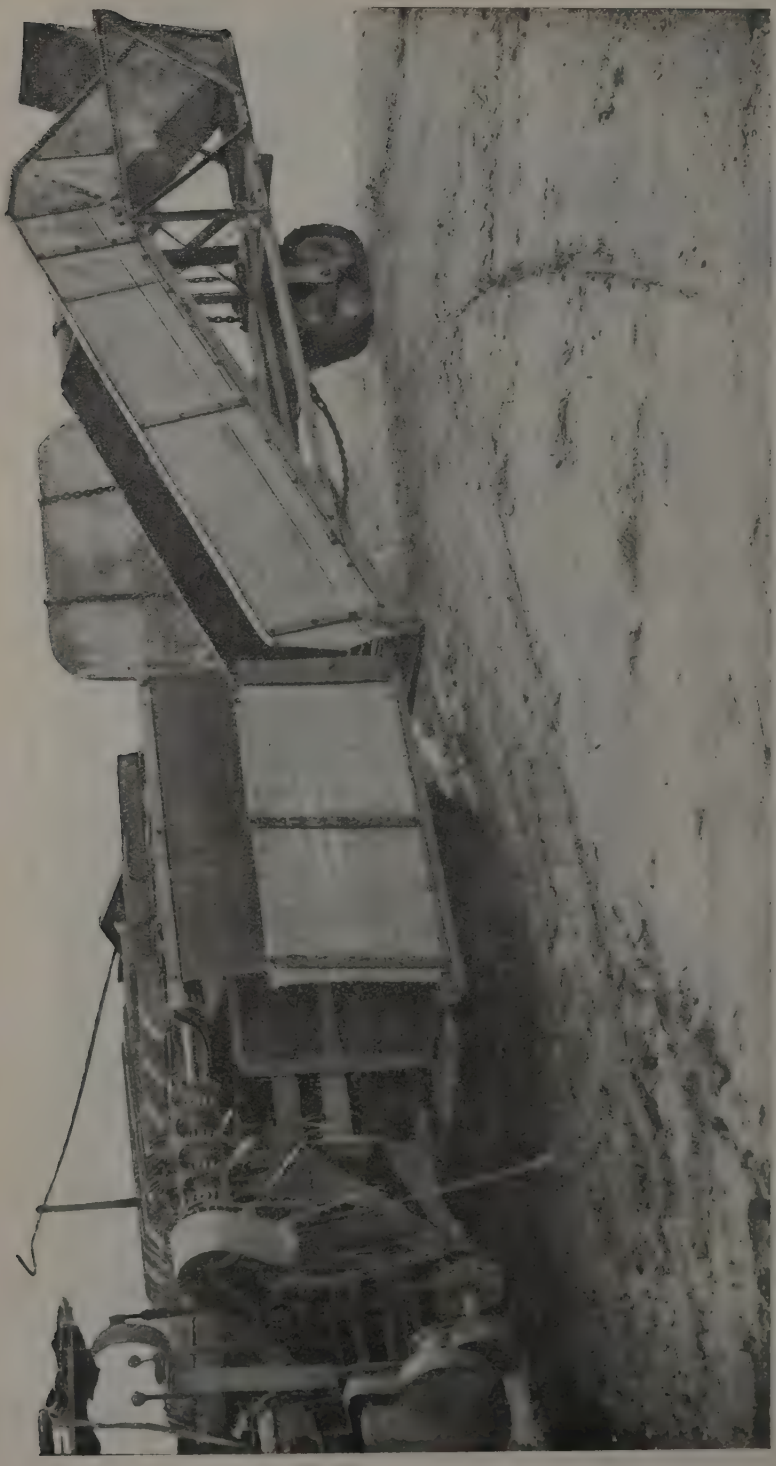


PLATE 36.—HOWARD CANE HARVESTER WITH LOADER ATTACHED.

tons per acre at a calculated rate of 5·7 tons per hour, and burnt cane of approximately 20 tons per acre at the calculated rate of 8 tons per hour. Taking into consideration the time of discharging the load, it took forty minutes to cut and discharge a load of 25 cwt. in the small cane, which equalled a rate of 37 cwt. per hour, or, if stoppages due to a minor breakdown be deducted, the capacity would have been at the rate of 43 cwt. per hour. In the larger cane the machine could handle from 3 to 4 tons per hour cutting and discharging. The handling and discharging of the cane from the truck as well as preparations for the next load, occupied a considerable amount of time.

This machine is expected to be working at Fairymead Plantation during the present season, with a view to its further development.

The illustrations, for which I am indebted to the "Australian Sugar Journal," give some idea of this machine.

Summary.

Although all of the machines mentioned in this chapter are of promise, the problem of satisfactorily harvesting cane by machines has not yet been solved.

[TO BE CONTINUED.]

TO NEW SUBSCRIBERS.

New subscribers to the Journal are asked to write their names legibly on their order forms. The best way is to print your surname and full christian names in block letters, so that there shall be no possibility of mistake.

When names are not written plainly it involves much tedious labour and loss of valuable time in checking electoral rolls, directories, and other references. This should be quite unnecessary.

Some new subscribers write their surname only, and this lack of thought leads often to confusion, especially when there are other subscribers of the same surname in the same district.

Everything possible is done to ensure delivery of the Journal, and new subscribers would help us greatly by observing the simple rule suggested, and thus reduce the risk of error in names and postal addresses to a minimum.

SOILS AND SUGAR CANE CULTURE—II.

CONSERVATION OF MOISTURE.

By H. W. KERR.*

LAST issue we discussed the mode of soil formation, and the nature of the plant food materials or nutrients which are absorbed from the soil through the plant roots. It will also be remembered that the process of food manufacture by the crop leaves was described; water from the soil and carbonic acid gas from the atmosphere were stated as the raw materials from which the sugars and more complex foods were built up, and in this process the soil nutrients played a most important part. Now the supply of nutrients in the soil may be available in such limited amounts as to restrict the growth rate of the crop, but in that event the ready means of supplying this deficiency are at our disposal in the form of artificial manures.

We have no control over the carbonic acid supply of the atmosphere, and indeed this is one factor which need give us no concern; but the remaining raw material utilised in our factory—water—is one, to the supply of which we must give our vary careful consideration. It is very evident to every farmer in Queensland how frequently the water supply of the crop is the factor most seriously limiting crop production. Except for those fortunate growers who have at their disposal an adequate supply of irrigation water to supplement the natural rainfall, the farmer is entirely at the mercy of the weather for his supply.

Water is the life-blood of the plant, and its importance as a raw product for food manufacture is but one of the many functions which it performs in our crop economy. If we had appropriate means for studying a growing plant, we would discover the very interesting fact that a vigorous stream of water carrying the dissolved soil nutrients is being continuously drawn in by the numerous fine roots, passing upwards through the water-conducting vessels of the stem, thence, firstly, into the main veins of the leaves, and finally through the finer network into the sugar-manufacturing cells. From these cells the water is passed out in the form of vapour through those same minute pores in the leaf surface which allow of the free entry of the carbonic acid gas of the atmosphere.

The quantity of water used in this way is not generally appreciated. Careful experimentation has shown that in the production of every ton of cane over 160 tons of water are pumped through the plant and evaporated from the cane leaf surfaces. In the growth of a 30-ton crop, then, practically 5,000 tons of water are demanded from each acre of soil. Expressed in terms of rainfall, we find that 50 acre inches of water must be made available to the crop for the purpose; or, again, each stool of cane must have access to almost 200 gallons of water during its growing period.

It must be clearly understood that to produce our 30-ton crop this quantity of water must actually be absorbed from the soil by the crop; and the relationship between this quantity and that which falls on the land surface as rain varies widely. In almost all of our cane areas the

* In a series of radio lectures by Dr. Kerr from 4QG.

average rainfall is well in excess of 50 inches a year; but it is well known that in times of heavy downfalls a greater or lesser proportion of the water drains from the land surface, and when run off in this way is obviously incapable of crop production. Then rainfall distribution is erratic, even in those cane areas most favourably served in this respect. For instance, in the Babinda-Innisfail-Tully districts, where the average annual rainfall is round about 150 inches, long spells of weather are experienced in which vigorous crop growth is suspended, due to moisture deficiency in the soil. The question of the absorption of the maximum volume of water by our soils, and its retention for use by the crop during rainless spells, is one of the greatest questions confronting the Queensland agriculturist, and we will study in some detail the factors underlying the problem.

If we wish to store water, we must provide ourselves with a reservoir. The soil itself is the obvious natural storage reservoir for the farmer; and a study of the factors involved in the ready absorption of rainfall and the conservation of the stored moisture gives us a clear understanding of the true functions of all tillage and cultivation operations which are so essential to successful crop growth.

The farmer, in ploughing and harrowing his land, aims at reducing the compacted soil to a good, mellow bed, in which conditions are most favourable for the germination of his seed. This requires a moist, warm, well-aerated yet firm soil, in which the young roots will develop freely, and where the helpful little microbes are able to do, without hindrance, their job of helping to provide for the plant-food needs of the crop. These are also the conditions which favour the most ready absorption of rain which is received by the land; and the production and maintenance of these conditions is of paramount importance if the farmer would take full advantage of all that is possible in this regard. We must also keep in mind another factor in water conservation, and that is the capacity of our reservoir. Under the most favourable circumstances, 12 inches of loamy soil will hold only 3 to 4 inches of water. If a quantity in excess of this is received in one fall, the capacity of the soil to hold the added supply obviously depends on the nature of the subsoil stratum. If this consists of a tight clay, which has probably been further consolidated and compacted under plough action with tractor or horses, the rate at which it will absorb moisture is very slow, and the chances are that much of the valuable rain in excess of 3 or 4 inches will be lost by surface run-off. It is therefore imperative that a careful examination of the soil be made to a depth of 2 or 3 feet, in order that a cultivation system may be devised which will be most suitable to the particular conditions. At all times the cultural methods employed should aim at preventing the re-formation of these so-called "pans." The continued working of even light cultural implements to a uniform depth makes for the creation of hard pans; and the secret of successful tillage lies in varying the depth of cultivation, in order that the work of any implement will eliminate successfully any harmful residual effects of the preceding one.

We may conclude, then, that large quantities of moisture may be stored only when methods of deep cultivation are practised. That does not mean ploughing to excessive depths; in fact, many a farmer has discovered to his sorrow the harmful effects of bringing up too much raw subsoil at one ploughing; for this material might completely ruin the tilth of the surface soil, due to its high clay content, besides adding

a mass of material deficient in humus and plant food. The correct thing to do is to break up the hard-pan layer, without bringing any of the subsoil to the surface. This can be effected most successfully by the use of the subsoiler. The essential features of such an implement are a long blade coulter, terminating in a narrow chisel-shaped point or piercer. This implement does not entirely crumble the compact subsoil, but it does cut a narrow gash into which water and air can freely enter. Later, the crop roots follow down after the moisture supply, and, working around and through the cake, will ultimately disintegrate the most compact hardpan, making the entire mass mellow and friable.

The correct time at which to carry out this operation is when ploughing is in progress. With a second team, to follow in the furrow behind the plough, the subsoiler may be put down 6 inches below plough depth, and in this way the soil is brought into an open, absorptive condition to a depth of from 14 to 16 inches. The season at which the work is carried out is also important; for if moisture conservation is our ultimate object the job should be finished in advance of the wet season. November or December ploughing is most valuable in our sugar areas, and where a crop of green manure is to be grown the improved conditions effected by the deep cultivation will favour this cover crop as well.

It is not sufficient to provide only for the absorption of moisture, but we must guard the stored supply against loss through other channels than crop growth. A moist soil continually evaporates water from its surface, and if this process were allowed to go on unchecked much of our good work would be nullified. The growth of weeds and grasses on our ploughed land also dissipates the moisture required by our economic crop, and they must be eliminated as soon as they appear. The operation of surface cultivation implements is effective in overcoming these evils, and the value of a mulch of dry surface soil so produced is well appreciated in its influence on the conservation of soil moisture. Following every rain, therefore, light scarifiers or harrows should be brought into operation, when the surface soil is in suitable condition, and the surface mulch again restored.

Many of the soils of our tropical coast do not, unfortunately, give permanent response to cultural operations. When an effort is made to reduce them to a condition of good tilth much difficulty is experienced, and persistent and excessive working on the part of the farmer results in the production of a loose, dry mass, which can scarcely be considered as a favourable seed-bed. With the first heavy rains this dusty mass runs together, and on drying becomes a hard, impervious, concrete-like cake. The correction of this difficulty, which is an inherent property of the soil in most respects, is one which can be effected only with considerable effort. The most reliable and satisfactory method is to increase the humus content of the soil. In fact, it is with respect to its favourable influence on the physical condition of the land that a good humus supply is so desirable. In addition, it gives the soil the capacity to retain large quantities of water, by virtue of the fact that one part of humus might hold twice its weight of water, while soil minerals possess a retentive capacity of only about one-sixth this value.

At first sight, the problem of maintaining the humus supply in the soil might appear quite simple: a heavy mass of green manure ploughed into the land should undoubtedly result in a marked increase in the content of soil organic matter. As a matter of fact, the ploughing under

of even a very heavy crop of beans or peas results in the gain of a, comparatively speaking, microscopic quantity of permanent humus. This point is stressed, not with the object of discouraging the growing of these valuable crops, which bestow upon the soil a wealth of beneficial effects, but rather to show farmers that they must not delude themselves into the belief that by green manuring they are building up reserves of humus in the land. For the canegrower there is, fortunately, a valuable source of material at his disposal, the use of which will enable him to effect this desirable purpose; this material is the cane trash and tops which remain on the field after harvesting, and which are so frequently regarded by the grower as a nuisance which must be tolerated until such times as he can apply a firestick and send up the potential humus-forming material, together with its valuable nitrogen in the form of smoke. But the problem of trash conservation is receiving the very careful attention of the Soils Laboratory of the Bureau, and it is hoped that the practical difficulty which its conservation entails will be overcome before long.

To conclude this necessarily sketchy review of the important subject of soil moisture, it must be emphasised that the working out of a cultural system best suited to any particular farm or soil type must be left in the hands of the individual farmer. He must make a careful study of his particular conditions, and with the essential principles clearly in mind, he should adopt those methods which aim—firstly, at the creation of conditions most favourable to the ready absorption of the rainfall; secondly, at the maintenance of these conditions as far as possible throughout the lifetime of the crop; and, finally, to make every effort to conserve this moisture against loss through weed growth or free evaporation from the compacted moist land surface. He will find that practices which achieve these purposes will be those which make for the most economic utilisation of available moisture and the production of maximum crop yields. The provision of an abundance of plant food in the soil is one of the surest means at the farmer's disposal for ensuring that the soil moisture will be employed to the best advantage. Under otherwise identical conditions, the rich soil will always produce a heavier yield, for a given water supply, than one poorly supplied with available nutrients.

PRACTICAL APPLICATION OF PRINCIPLES.

In this, the concluding talk of the series, it is proposed to discuss certain important aspects of sugar-cane agriculture in the light of the principles previously outlined. The farmer's first consideration, in this respect, is the preparation of the land for planting. No hard and fast rules can be laid down for the number of ploughings, harrowings, or other preparatory treatment to be employed, for this depends so much on local factors. The grower must develop his own system in the light of his past experience. There are, however, several important points which should be kept clearly in mind. The objective is the production of a deep, moist, mellow seed-bed in which conditions are most favourable for rapid germination and ready development of the young crop. It may require six ploughings with intermediate harrowings to produce this, or it may be done by two. But it is well to remember that the minimum of work which is necessary to produce the desirable seed-bed, the better it will be for the land. We should be quite clear on this point; there is no virtue in ploughing the soil six times in an attempt to reduce it to a

state of good tilth. On the contrary, such a practice indicates either a difficult, intractable soil or lack of timely work on the part of the farmer.

It is well appreciated that a soil which necessitates this treatment is generally in an unsatisfactory final condition. Either it is still lumpy or has been reduced to dust. There is a definite time at which almost every soil can be worked most easily, when it will readily mellow and crumble under the action of the implement. This condition depends entirely on the moisture content of the soil, and growers could well pay more careful attention to this factor. If worked at a higher moisture content the clay particles run together, the soil becomes puddled, and breaks up in hard clods. If worked when very dry, the soil crumbs are broken up to give a dusty soil which exhibits those same undesirable characteristics with the first rains. With the more general use of the disc plough—certainly a very valuable implement in its place—it is felt that insufficient attention is paid to the condition of the soil for ploughing, and very frequently this important operation is deferred until the soil has become too dry.

With regard to the depth of working, it is doubtful whether any benefit is to be derived from ploughing to a greater depth than 10 inches of compact soil. For the second or subsequent ploughing, this would mean about 12 inches of loose soil. Certainly the soil should be opened up to greater than plough depth, but the breaking up of the subsoil should be carried out with the subsoiler, which brings none of this raw material to the surface. In its influence on moisture conservation, the value of subsoiling cannot be overstressed, provided the work is done in season. The correct time to carry out the operation is when the land is being broken up, in advance of the wet season. Besides the beneficial effects of large volumes of water which may thus be stored, to a depth of several feet, it must be borne in mind that cane is essentially a deep-rooted plant, which, under favourable circumstances, will send its feeders down to 5 and 6 feet. The value of a store of moisture in the depth of the subsoil will be readily appreciated in prolonged dry spells.

It should be the aim of every cane farmer to grow and plough under a crop of legumes before planting his cane. For this purpose, Mauritius beans are preferred in the northern and cowpeas in the central and southern areas. In this connection, the superiority of the Poona pea should be recognised. This legume, which is closely related to the cowpea, is now finding great favour in Southern Queensland, for it withstands adverse conditions much better than the cowpea, and usually takes three or four weeks longer to attain full maturity; incidentally, it stands up better to any attack from the bean fly than cowpea. The use of this legume cannot be too strongly recommended to those growers who have difficulty in obtaining a stand of cowpea.

Any special treatment given to the land for the benefit of the leguminous crop will be effort well spent; and, far from being wasted, will facilitate the final preparation for cane after the legume has been ploughed under. A good cover of beans or peas is very valuable in its influence in lessening the harmful beating effects of heavy rain. Every drop of rain during heavy falls acts as a tiny hammer which tends to drive the soil grains together into a compact mass, and the value of the cover crop in eliminating this effect is well appreciated by those who carry out the practice. The legume will, in general, be ready to turn under somewhere between February and April. In general practice, if

this is done when the seed pods are in the milk stage the best results will be attained. Under warm, moist conditions, the succulent material will rot down within six or eight weeks, and the land is then ready for planting to cane if weather conditions are suitable.

It is the policy of the Bureau to advocate strongly the planting of the cane crop at this time. Soil moisture conditions are then excellent; usually the ground is warm, and a good germination may reasonably be expected. Under these favourable conditions the crop becomes readily established, and although it makes no apparent growth during the winter months, it is ready to take full advantage of the first spring rains to push ahead, cover in the rows, and be out of hand before the wet season. Further, by autumn planting, an important job is finished in advance of the busy harvesting season. There are many growers who strenuously oppose the practice, and under certain special circumstances the objection is valid. The superiority of autumn over spring planting has been so frequently demonstrated that it can be accepted as the more desirable practice.

When planting time comes, the question of the plant food supply for our crop should be dealt with. If the farmer has ploughed under a leguminous crop, he may safely assume that he has provided for the nitrogen requirements of the plant crop of cane. But it should be remembered that the beans or peas do not effect a gain in the plant food supply of the soil with respect to any other nutrient but nitrogen. Any phosphoric acid or potash which becomes available from the decomposition of the green manure was originally absorbed from the soil; and therefore, if a deficiency in the supply of either of these plant foods has been established for the particular soil, steps should be taken to apply the appropriate fertilizer materials which supply these needs.

If the crop is to make the best use of the added plant food, it is reasonable to suppose that the earlier it receives it the better. The truth of this has, indeed, been demonstrated repeatedly, and it is our practice to apply any phosphatic or potash-bearing fertilizers in the drill with the cane plants. When green manuring has not been practised, it will probably be found that the soil is lacking in available nitrogen, and in this case a top dressing of sulphate of ammonia should follow the earlier drill mixture. Nitrogen is a costly plant food, and one which is readily leached from the soil before it can be absorbed by the crop. For this reason it is recommended that the sulphate of ammonia be applied at a time when the root system is fairly well established, and it is generally found most convenient to apply it when the crop is stooling vigorously. This fertilizer should be distributed on the surface of the ground, alongside and close to the stools. It will be readily absorbed by the soil with the first rains or even with a heavy dew. It is not necessary to await rainy weather before making the application, and if applied in dry weather it will not evaporate, as is often supposed.

The subsequent treatment which the plant crop is to receive will depend entirely on climatic conditions. After every rain surface cultivation will control weed growth and restore the surface mulch which is so valuable in moisture conservation. If the soil becomes packed by heavy rain, deep cultivation is essential. In this case the grubber or subsoiler should be used to restore the open, absorptive condition in the land.

Remember the principles which were laid down earlier in this regard, and aim always at preserving those soil conditions which make for the ready absorption of moisture and the free penetration of the crop roots, to take full advantage of everything that is possible under the prevailing environmental conditions. It may be argued that the deep cultivation here advocated will result in harmful root-pruning, and this is certainly true. But the farmer must weigh the disadvantages associated with this operation against the distinctly beneficial effects which will follow. In general, the grubbing will be done comparatively early in the growing period and the crop will readily replace such surface roots as are thus removed.

Another important subject which should be discussed at this time is the method of ratooning to be employed. There is no doubt that the falling off in yield as between the plant crop and the succeeding ratoon is much greater than it should be, and calls for immediate attention. The first important point is that the ratooning season coincides with what is usually dry spring weather; therefore the available soil moisture must be guarded most jealously, for every drop is needed to start off the young ratoons. Under these circumstances, it is fatal to plough away the soil from the stools as is so commonly done. This generally leaves the soil in large clods, which are rapidly dried out, as is also the exposed side of the cane stool. Unless rain supervenes, it is impossible to work this soil back to a condition of good tilth, and the ratoons suffer.

It is certainly essential that the soil should be worked in order to facilitate the young ratoon roots in their search for moisture, and the use of our subsoiler cannot be bettered for the purpose. When the trash is burnt off, as is the usual practice, it will be found that the compact surface soil is generally moist, even in dry weather. A suitable harrowing implement if employed immediately will restore a surface mulch and thus conserve what moisture is available. The use of the bumper discs for this purpose also destroys the uppermost eyes of the stool and promotes the germination of those lower in the ground. The importance of this feature cannot be over-stressed. The subsoiler should now be run along each side of the stools to a depth of 12 inches, by which operation the soil is reduced to a condition of good tilth without its being exposed to the sun and air to be dried out. We have produced those conditions which will best favour the development of the young ratoon roots, and our next operation is to provide them with the essential plant food to accelerate their growth. In this respect the need for fertilizer on ratoons is even greater than for the plant crop, and this is particularly true in the case of nitrogen. The mixed fertilizer should be applied at a depth of 3 or 4 inches alongside the stools, and the crop top dressed a few weeks later with sulphate of ammonia. As the crop develops, grubbing the interspaces with the subsoiler should be continued until finally the soil is restored to something approaching its original favourable tilth of planting time.

It is unfortunate that time does not permit of a discussion of many more of the important aspects of cane culture, particularly the consideration of such questions as trash conservation, land drainage, and the destruction of harmful substances such as acidity in the soil; however, it is hoped that these questions may be taken up at an early date.

THE HONEY BEE.

By HENRY HACKER, F.E.S., Entomological Branch.

THE honey bee has probably had longer associations with man than any other insect. The reason for this association is man's natural craving for sweets, and the fact that until recent times honey was the only accessible substance containing sugar in a concentrated form. It is not surprising, therefore, that man's interest in the honey bee goes back to prehistoric times. He was probably for thousands of years, like the bears, a systematic robber of wild bees until, possibly during the neolithic age, he became an apiarist by enticing the bees to live near his dwellings in sections of hollow logs, or in earthen vessels. Savage tribes keep bees to-day, and within their geographic range no people are known who have not kept them. They figure on the Egyptian monuments as far back as 3,500 B.C., and even the price of strained honey under some of the Pharaohs is known. It was very cheap—only about twopence halfpenny a quart.

The first reference to bees in Australian records occurs in a letter from Gregory Blaxland (1st March, 1805), asking for cargo space on the "William Pitt" for a "swarm of bees in cabin with wire cage over the hive." There is, however, no evidence of their safe landing. The first record of the actual introduction of bees occurs in a letter from Samuel Marsden to the Secretary of the London Missionary Society, in which he mentions that on his way back to the colony in the ship "Ann" he purchased, at Rio de Janéiro, two hives, which were safely landed on 27th February, 1810, and placed in the garden of Government House; these were the "black or English" bees. The Italian race was a much later introduction, between the years 1874 and 1878.

Species of Honey Bees.

In the family Apidæ, to which the honey bees belong, social organisation attains its highest phase of development. The single genus Apis comprises but four species—viz., *mellifera*, *dorsata*, *indica*, and *florea*. The largest and most primitive of these species is *Apis dorsata*, an Indian bee which forms large and massive, naked combs suspended from branches or rocks. It selects a locality where suitable flowers afford abundant supplies of nectar and, after these have ceased to bloom, the whole colony migrates to another situation and there constructs a new comb. On account of its nomadic life it has not been possible to establish this species of bee in apiaries. *Apis florea* is the smallest member of the genus. *Apis indica* and *mellifera* are so closely related that doubts have been raised regarding their specific distinction. They both nest in hollow cavities, especially those in tree trunks. *Apis mellifera* is the common honey bee of apiaries.

Collection of Nectar and Pollen.

As bees not only collect but transport nectar and pollen, several structures have been developed for this purpose. Two pairs of mouth parts are peculiarly modified for lapping or sucking up the nectar. In order to store this nectar while it is being transported to the nest, the crop or honey-stomach is large, bag-like, and distensible, and its walls are furnished with muscles which enable the bee to regurgitate its con-

tents. This is now known as honey because while in the crop it is mixed with a minute quantity of a ferment or enzyme, and undergoes a chemical change, its sucrose or cane sugar being converted into invert sugars (levulose and dextrose).

Even more striking are the adaptations for collecting and carrying the pollen. The whole surface of the bee's body, unlike other insects, is covered with dense, plumose hairs which easily hold the pollen grains until the bee can sweep them together into masses moistened with a little honey, and attach them to the outer surfaces of the hind legs. These parts are peculiarly broadened and provided with long hairs to form a special pollen basket.

Adaptability of the Common Honey Bee.

The spread of the common honey bee throughout the world is due, firstly, to its extraordinary adaptability to the most diverse flowers; secondly, to its habit of storing large quantities of honey; and thirdly, to its ability to generate heat from its food and thus maintain a rather high temperature in the hive during periods of cold weather, and conversely to reduce it when necessary by "fanning" with its wings, thus keeping an equable temperature within, irrespective of the conditions without. This unusual plasticity is peculiar to the species and is not the result of domestication. The insect, in fact, has never been domesticated in the same sense as farm animals; it is simply a wild insect induced to dwell near man's homes by being provided with conditions most suited to its comfort and prosperity, and its successful management is based entirely on a knowledge of its behaviour under the varying conditions of season and locality.

Bees possess a highly developed sense of smell, and this is the dominant factor in their communal life. Modern research has demonstrated that a number of distinct odours are present in the hive, such as the colony odour, the individual odour, the brood odour, the wax odour, and the honey odour. The hive odour is composed of a mixture of these, and every member of a colony, besides its individual odour, carries the hive odour which forms the basis of mutual recognition between bees belonging to the same colony.

To know the part that odours play in the behaviour of bees is of considerable importance to bee-keepers, because the introduction of queens, uniting, and various other manipulations may be performed more successfully.

Worker Bees.

As the vast majority of the inhabitants of a hive consist of workers, they will be considered first. The life of the worker bee may be divided into three periods, as follows:—

First Period.—The newly emerged bees prepare cells for the reception of the future eggs and also help in maintaining the right temperature of the hive. After the second day, feeding of the older larvæ with honey and pollen is taken over, and this goes on until the sixth day. From the sixth until about the fifteenth day, the pharyngeal or brood food glands are functionally active and the bees consequently devote themselves to feeding the very young larvæ. By the end of this time the pharyngeal glands tend to atrophy and brood-feeding ceases.

Second Period.—This is begun with their first flight from the hive, and for short periods in the middle of the day they may be seen flying in ever-widening circles around their hive while orienting themselves—that is, memorising their home or the place where it stands. Each day their flight is extended until they have learned the landmarks for a considerable distance around. During this period the bees also receive and store nectar from the foraging bees; they attend to the pollen brought in and act as general workers in the hive. Bees of this age have their wax glands in the active secretory phase. If they are watched closely during the height of the honey harvest there will be found little pearly discs of wax, somewhat resembling fish scales, protruding from beneath the second to the fifth ventral segments of the abdomen. These are scraped off with the legs and after being masticated and manipulated in the mandibles the wax is applied to the comb. Towards the close of this period, which lasts for about ten days, the bees may take on the function of guarding the hive entrance.

Third Period.—In this period, which is from twenty to thirty days' duration, the workers are active only in the field and are engaged in foraging for water, pollen, and nectar. They continue at this work until they die.

As fresh bees hatch from the cells successively, there is always a number of them of different ages occupied on different duties.

Drones.

The drones or males are readily distinguished from the workers by their greater size, their large eyes, and the absence of a sting. They are produced in some numbers seasonally by prosperous colonies, and towards the end of summer they are cast out of the hive by the workers. Both drones and workers are relatively short-lived.

Queen Bees.

Normally there is only a single queen in the colony, and she will not tolerate the presence of another young queen.

Swarming takes place by the old queen leaving the colony accompanied by a large detachment of workers when a young queen is about to emerge from her cell, and if several young queens are to emerge in succession, the older leaves before the next appears.

When the queen's eggs are fertilised they develop into workers or queens according to the way the larvæ are fed, but when unfertilised into males or drones, as is also the case with the eggs that are sometimes laid by workers.

Except in the development of her ovaries, the queen bee is a degenerate female, a mere egg-laying machine, entirely dependent on her worker progeny. The pollen-collecting apparatus of the hind legs is undeveloped, her tongue and sting are shorter, and her brain is smaller. That these differences are due to larval feeding is proved by the experiment of transferring eggs and very young larvæ from worker to queen cells and *vice versâ*. Transferring eggs from drone to worker or queen cells does not, however, alter the sex of the insect reared, since it develops from an unfertilised egg.

Under normal conditions the time required for the development of each of the three castes differs, so also does the chemical composition of the food administered to the larvæ of each caste. The composition

of the food, which for the queen and the earliest stages of the workers and drones is known as royal jelly, is a secretion of the pharyngeal glands of the worker nurses. The queen, although the largest of the three castes, reaches maturity in about sixteen days. She is fed only on "royal jelly" without admixture of honey or pollen. That highly nutritious ration (43·14 per cent. proteid) is undoubtedly responsible for her very rapid growth. The worker is given pollen and honey after the fourth day and requires twenty-one days to complete her development. The feeding of the drone is similar but he receives less sugar and more fat, and his development is protracted to twenty-four days.

The foregoing considerations suffice to show the complexity of the whole matter of sex determination and caste differentiation in the honey bee. The main object of the rich and abundant food administered to the larva of the queen honey bee is evidently the rapid development of her ovaries, so that she may begin to lay eggs very soon after emergence. The great size of her ovaries accounts, of course, for her extraordinary fecundity and the size of her colony. Cheshire computed the number of eggs which may be laid during her lifetime by a vigorous queen as about 1,500,000. It is not surprising, therefore, that a hive, at the time of its maximum development during the early summer, may contain 50,000 to 60,000 or even 70,000 to 80,000 bees.

Value of the Honey Bee to Man.

As a final consideration it should be remembered that, in addition to its honey production, man is greatly indebted to the bee for the important part which it plays in the fertilisation of fruit trees and other economic plants.

WARNING TO TOBACCO GROWERS.

The Minister for Agriculture and Stock (Mr. F. W. Bulcock) in referring recently to the expansion which has taken place in the tobacco-growing industry, remarked that, regardless of warnings issued by the Department of Agriculture, many prospective growers have taken up land and engaged in the industry on a commercial scale in districts where tobacco had not hitherto been grown. A large number, moreover, have not had any previous knowledge of agriculture, consequently the results have naturally been in many instances unsatisfactory.

Although cultural and curing methods are of much importance, it is a well recognised fact that soil and climate are the main determining factors in the production of a high-quality tobacco. The suitability of a soil for the growing of an agreeable smoking tobacco can only be ascertained by actual experiment. If this were not so, the necessity would not arise for the large expenditure of time and money in exploring the possibilities of various districts for tobacco growing. It required some four years of actual experiment to definitely prove that Mareeba is a district where tobacco acceptable to the manufacturers' needs can be profitably grown. Growers are therefore strongly advised against the growing of tobacco upon a commercial scale on untried land, or until such time as the suitability of soil and climate, at least in their particular locality, has been determined. Farmers who own land could, however, test the possibilities of tobacco by growing a small patch, say, 100 plants, and submitting samples of the resultant crop to the Department of Agriculture and Stock for examination and report.

Prospective tobacco growers are specially warned not to be influenced by statements made by vendors of land who claim that the land they are offering is suitable for tobacco. In many cases no proof of this assertion is forthcoming, and men have gone on to blocks of land which are claimed to be suitable for tobacco, only to subsequently find that they have been entirely misled by the vendors.

POWDERY SPOT AND FRUIT SCAB OF THE PASSION VINE.

By J. H. SIMMONDS, M.Sc., Plant Pathologist.

DURING an investigation into the brown spot disease of the passion vine, the presence of another foliage and fruit disease became manifest. This disease, which has been designated powdery spot or alternatively scab when affecting the fruit, is not of such serious consequences as the common brown spot. This is partly due to the fact that the former disease is more restricted, both in its seasonal occurrence and distribution. However, it is of sufficient interest and importance to justify the following notes which are mainly based on observations made incidental to the investigation of brown spot.

Symptoms.

Powdery spot restricts its attentions to the younger terminal shoots and fruit. On the leaves the disease first appears as a small, circular, translucent spot, with a narrow faintly-brown border. This spot may enlarge to from 3 to 6 mm. in diameter, but seldom more, a definitely circular shape being retained throughout. The spot is at first entirely translucent, but later a grey powdery area commences to form from the centre outwards on either the upper or lower surface, this being due to the fructification of the fungus associated with the disease. Finally, the original translucency is obscured. (Plate 37.)

These spots are usually sparingly scattered over a leaf, but may be numerous when coalescence produces a larger irregular more or less water-soaked area.

Spots closely resembling those on the leaf may occur on the sepals of the young bud or open flower. These lesions probably have a direct relation to the development of the fruit scab later described, since the floral structures persist in the dry condition until the fruit is of considerable size, and any spores produced thereon will naturally tend to become washed down over the young fruit.

Lesions also occur on the younger parts of the runner, petiole, and tendril, when they take the form of a brown sunken area usually partly filled with the powdery spore mass. (Plate 37.)

The effect produced on the fruit has previously been ascribed by growers and others to various causes, including insect attack. The lesions commence as minute, light-brown, slightly depressed dots, which enlarge until they are from 2-3 mm. diameter, at the same time retaining a definitely circular shape. By growth of rind tissue round the margin of the lesion the affected area is raised somewhat above the general level of the surface, so that a crater-like effect is produced. (Plate 39.) Close examination of the lesions at this stage shows that the outer layers of the rind are constituting a thin shell covering a small cavity. Under the right climatic conditions this covering may bear a thick dusky coat of spores, similar to that occurring on the leaf lesions. Sooner or later the thin and brittle cover becomes ruptured, leaving a more or less irregular cavity lined with loose light-brown tissue. At a

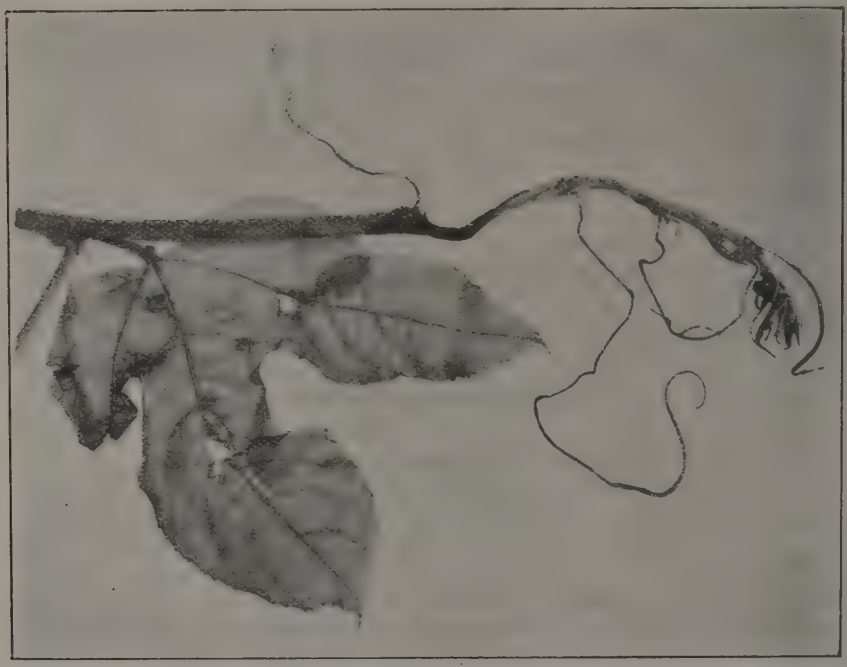


PLATE 37.

Terminal shoot of passion vine, showing defoliation and lesions on stem and leaf caused by powdery spot (*Cladosporium sp.*).

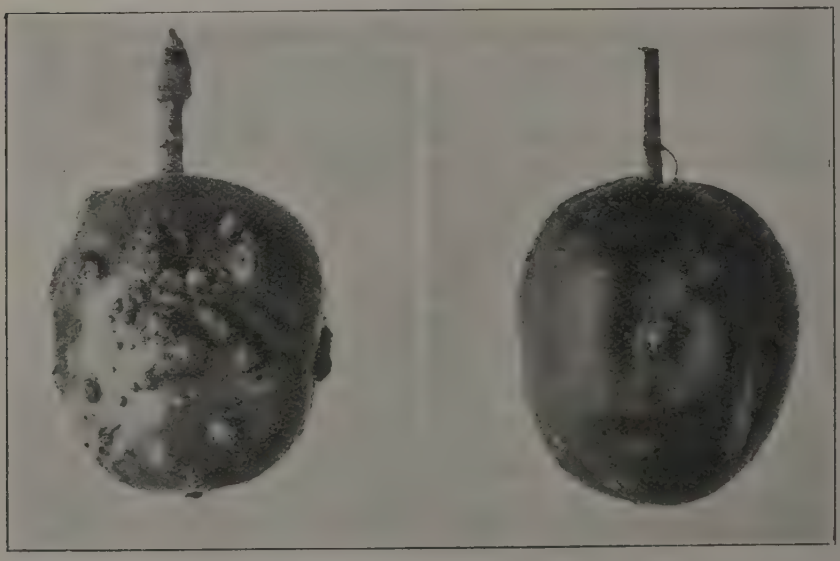


PLATE 38.

Left: Fruit of passion vine (*P. edulis*), showing final stage of scab formation.
Right: Fruit of *P. herbertiana* similarly affected.

PLATE 39.
Fruit of the passion vine, illustrating early stages in scab development; epidermal layers mostly intact and bearing spore mass.

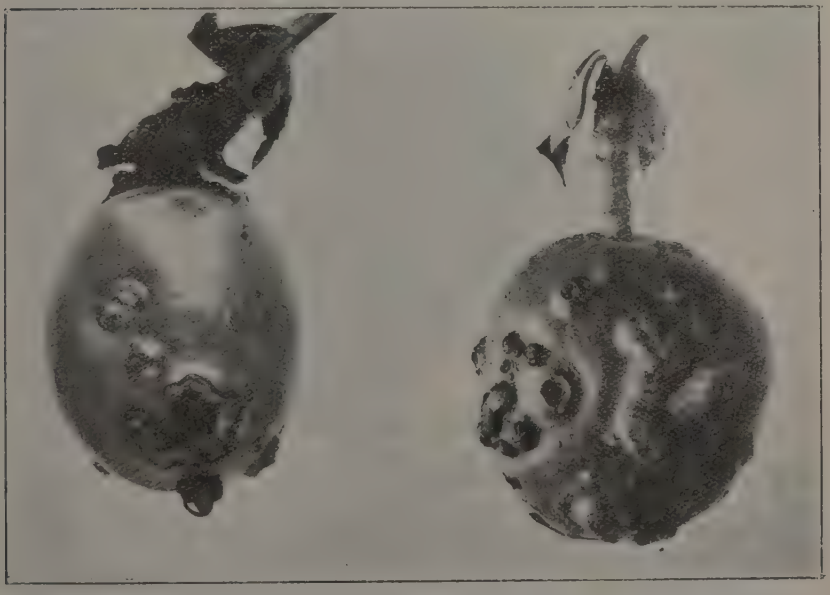


PLATE 40.
Passion fruit showing the final stages in scab formation; elevation of scab tissue taking place.

further stage, vertical growth is stimulated below the excavation, with the result that the corky tissue lining it is eventually elevated into a definite dome-shaped or fissured scab of from 1-3 mm. in height. (Plate 40.) At this stage, practically all trace of their fungus origin has disappeared.

Development of Fruit Scab.

As has been pointed out by Noble[1] the pericarp or rind of the passion fruit consists of an outer epidermal layer one cell wide, a subepidermal layer three cells wide, a well defined band of thick-walled closely packed sclerenchymatous tissue three or four cells wide, below which is the main section of the rind consisting of parenchymatous tissue, interspersed with vascular and fibrous elements.

Microscopic examination indicates that after infection the fungus is at first dominant, and a small semi-circular cavity is formed by the disintegration of the parenchymatous tissue, amongst the debris of which fungal hyphæ may be found. Completely covering this cavity externally is the thin and brittle veil formed from the epidermal and subepidermal layers, supported by fungal hyphæ, and bearing a mass of conidiophores and spores. (Plate 41, fig. 1.) The cells of the sclerenchyma adjacent to the region of invasion undergo a certain amount of degeneration, much of their thickening being lost, until their differentiation as distinct from parenchyma practically disappears.

Before this destruction has progressed much more than a millimetre or two inwards, cells below the excavation take on a meristematic function, and eventually a definite phellogen appears. From this there is produced on the outside a few layers of a corky nature, and from the inner side definite radial rows of a tissue consisting largely of sclerenchymatous elements. It is the continuous formation of this latter tissue which eventually ruptures the covering veil and produces the hard scabby excrescence. (Plate 41, figs. 2, 3.)

The tissue of the passion fruit rind appears easily stimulated to form intumescences of this nature, as small warts of a similar appearance and construction to the fungus-induced scabs may be produced by lightly pricking the surface of young fruit under sterile conditions, and placing them in a moist chamber for several days at 21 deg. Cent.

Apparently it is usual for infection of the fruit to take place during its early stages of growth, while the raised scab stage may reach its final dimensions after full diameter is attained. A slight deformity of the mature fruit may accompany the presence of one or more scabs, owing to a restriction in the growth of rind tissue immediately surrounding the point of infection.

Effect on the Plant.

As will be pointed out later, powdery spot is of seasonal occurrence and attacks the vine with severity only during the cooler winter months, and hence the quantitative loss resulting is not so great as might otherwise be the case. Nevertheless, the winter crop which is affected is usually the one fetching the best price throughout the year.

The passion vine leaf reacts to the presence of powdery leaf spot in much the same way as when infected with brown spot. That is to say, the leaf usually falls soon after being attacked, and hence considerable

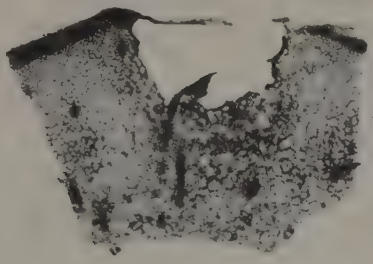


Fig. 1.

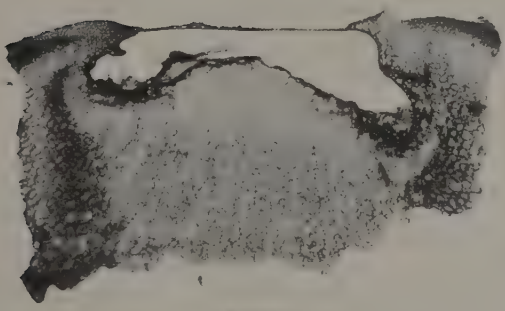


Fig. 2.

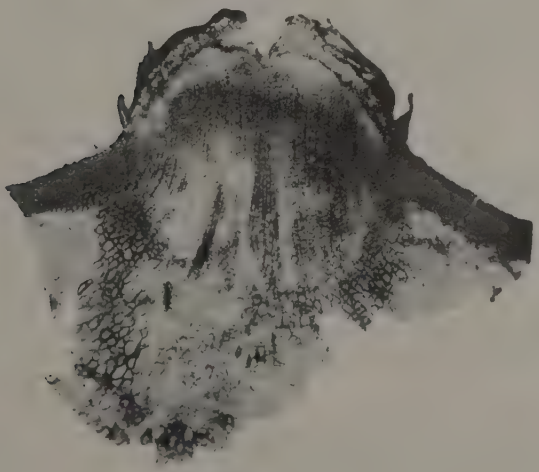


Fig. 3.

PLATE 41.

Free-hand sections of rind of passion fruit attacked by *Cladosporium sp.* indicating method of scab formation (x 17). Fig. 1. Early stages of infection; phellogen appearing below margin of invasion; veil broken in sectioning. Fig. 2. Radial growth under way. Conidiophores of *Cladosporium sp.* still present on the intact veil. Fig. 3. The scab formed; remains of veil left as lateral scales; phellogen lying between superficial corky layers and radially arranged tissue forming bulk of scab; general rind tissue below.

defoliation of the younger terminal leaves—the only ones affected by this disease—may take place. Sometimes the leaves do not fall, but a deformed and shot-hole condition results at maturity. During an epidemic, the runners up to 6 inches or a foot back may be spotted and cinctured, with the result that the shoots wilt and die back. (Plate 37.)

With a quickly-growing plant such as the passion vine, the resulting effect of damage such as described above is not of a permanent nature. It is different, however, with the fruit. When badly scabbed these may be rendered quite unfit for market, or when less blemished a reduction in grade may be necessary. A considerable loss in winter and early summer crop fruit may be experienced from this cause.

In contrast to the case of brown spot, powdery spot is most serious on young vines up to eighteen months to two years old. The succulent foliage and fruit formed on vines of this age appear specially subject to attack. Moreover, the effect is much more pronounced on a young vine when the number of fruiting laterals is more limited.

Cause of the Disease.

Associated with the lesions of powdery spot on leaf and stem and with the early stages of the disease on the fruit is almost invariably to be found a species of *Cladosporium*. Attempts to obtain artificial inoculation with this fungus under field conditions were not successful. This was no doubt due to the somewhat restricted temperature and moisture requirements of the fungus, as typical lesions were subsequently obtained by inoculating young leaves held in moist petri dishes at temperatures between 15 deg. Cent. and 25 deg. Cent. Infection was obtained through uninjured surface, though less readily than when the leaf was pricked. There was no difficulty in reisolating the *Cladosporium* from these lesions. This, together with the universal association of the fungus with the disease, especially in the early stages, is considered sufficient justification for assuming its causal relationship.

No previous mention of a passion vine disease of this nature has been seen, unless it is a reference made by Cobb[2] in 1903. In an article entitled "Diseases of the Passion Vine," he described a torn and shot-hole appearance of the leaves with which was associated an Oospora-like fungus. The description and diagrams given might easily refer to a *Cladosporium*, such as the one under consideration. The spore measurements (4-6 by 9-16 μ, averaging 5-7 by 12-6 μ), although not entirely agreeing, do not differ greatly from those of the Queensland species.

In the absence of the necessary literature no attempt has been made to establish the specific identity of the *Cladosporium* associated with powdery spot.* The parasitic organism can be readily distinguished from species of the same genus commonly found associated with the passion vine in a saprophytic capacity by certain cultural characters on potato dextrose agar. These are (1) the length of time taken for colonies to become visible—usually three days at 27 deg. Cent.; (2) the chocolate-brown restricted and convoluted nature of the

* With a view to obtaining definite identification, both the *Cladosporium* from powdery spot and the *Macrosporium* causing brown spot have been submitted to the Imperial Mycological Institute, Kew.

growth at temperatures above 25 deg. Cent. in contrast with the flat spreading type of the saprophytes; (3) the absence of a white mycelial overgrowth in old cultures.

Two types of spores are found both in nature and in culture. The more abundant form is small oval to elliptic continuous, with an articulation collar at one or both ends. The other is a more elongate type, almost cylindrical in shape, continuous or one septate with an articulation collar at both ends. Although intermediate forms exist and both may be formed in series on the one conidiophore, it has been found more convenient to constitute two classes for the purpose of spore measurements, which are as follows:—

Host.	No.	Cylindric Type.				Elliptic Type.			
		Length Mean.	Breadth Mean.	Length Extremes.	Breadth Extremes.	Length Mean.	Breadth Mean.	Length Extremes.	Breadth Extremes.
P. edulis	50	13·7	4·2	8-21	3-5	6·1	3·9	2·5-8	2·5-5
P. herbertiana ..	30	11·6	4·0	9-16	2-5	6·3	3·7	4-8	2-4·5
P. alba	30	11·0	4·3	7-16	3-6	6·5	4·0	4-8	3·5-5

Other Hosts.

Passiflora herbertiana, a native species found sparsely distributed throughout the coastal rain forest country of Queensland, has on somewhat rare occasions been found to exhibit a disease identical in its foliage and fruit symptoms to the powdery leaf spot and scab of *P. edulis*. A *Cladosporium* may be obtained from the wild vine similar as regards cultural and morphological characters to that associated with the disease on the cultivated passion.

A powdery leaf spot has been found on the white passion flower (*P. alba*), also showing a general resemblance to the disease on the other two species. No fruit symptoms, however, have been observed on this host. The cultural characters of the associated *Cladosporium* would suggest that this organism is distinct from the one occurring in the other two cases.

It is interesting to note that, while it is very common for *P. alba* to be affected with a disease identical with the brown spot of the passion vine caused by *Macrosporium* sp., *P. herbertiana* has never been known to be affected with this disease.

Distribution.

So far the only records of powdery leaf spot occurring on *Passiflora edulis* are from two widely separated districts. These are Tamborine Mountain, a district situated not far from the southern border, and the Evelyn Tableland, in North Queensland. Both of these localities are high, the former being 1,600 feet and the latter 3,000 feet above sea level. This distribution is interesting when considered in the light of some of the physiological relationships of the fungus concerned.

On *P. herbertiana* the disease has been found on rare occasions in the Gympie and other South Coast districts, as well as at Tamborine Mountain. The allied form on *P. alba* has been recorded mainly from coastal districts, with the Northern limit at Innisfail.

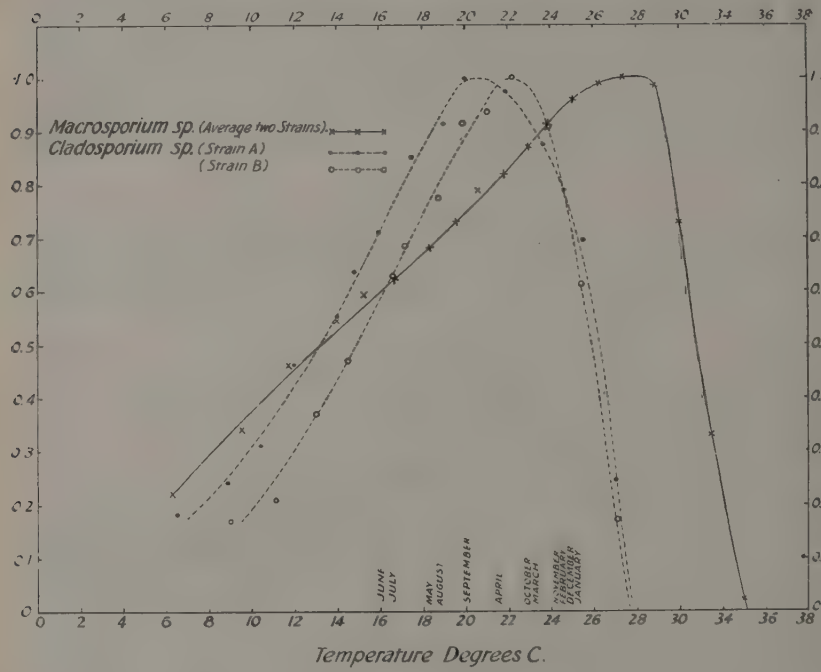


PLATE 42.

Fig. 1.—Growth-temperature curves of *Macrosporium sp.* (average of two strains) from brown spot and *Cladosporium sp.* (two strains) from powdery spot of passion vine. Six days' growth in the case of the former and approximately four days' growth in the case of the latter on potato dextrose agar. Ordinate values expressed in terms of the corresponding maximum growth in millimetres taken as unity in each case.

Temperature Relationships and Seasonal Occurrence.

It is interesting to compare the temperature relationships of the *Cladosporium sp.* associated with powdery spot and the *Macrosporium sp.* causing brown spot, and note the corresponding differences in seasonal development of the two diseases.

Brown spot normally occurs in the months of August to March, inclusive, being most serious during the summer months of October to January.

Powdery spot, although it may be seen as an isolated lesion at most times throughout the year, usually becomes sufficiently prevalent to be noticeable only by April. By June and July the disease may reach its peak, and considerable leaf and fruit spotting and terminal die back may be present at this time. Foliage symptoms become less abundant as the weather becomes warmer in the spring, but the fruit may exhibit

the results of an earlier infection by the presence of raised scabs as late as November. At times an early setting of summer crop fruit may also become scab infected.

Examination of the growth temperature curves given in Plate 42 will help to explain these differences. The *Cladosporium sp.* has a maximum of 28 deg. Cent. and an optimum ranging from 20 deg. Cent. to 22 deg. Cent. The maximum for the *Macrosporium sp.* is 35 deg. Cent., while the optimum lies very close to the maximum for the *Cladosporium*. With both organisms spore germination is favoured by the same temperatures as is vegetative growth. This is in accordance with the leaf infection studies with *Cladosporium* before mentioned, where lesions were produced readily between 15 deg. and 25 deg. Cent., but scarcely at all outside this range.

It was also demonstrated during the attempts to obtain leaf infection with *Cladosporium* that abundant moisture is necessary for this to take place, and that young leaves are much more susceptible than those which have commenced to harden off.

In Plate 42 the mean maximum shade temperatures per month over the last six years at Tamborine Mountain have been indicated by inserting the name of the month opposite the appropriate temperature reading. Reference to this would suggest that it is the high temperatures of the four summer months which largely determine the marked difference in the seasonal activity of these two passion vine diseases.

The restricted distribution of powdery spot is no doubt also due to the cool moist conditions required by the fungus concerned. These are much more nearly satisfied in a situation such as Tamborine Mountain than in the warmer and dryer regions of lower elevation.

Control.

Any attempts made to control powdery spot have been incidental to experiments conducted for the control of brown spot. For details regarding these, the reader is referred to an article on the latter disease which appeared in the "Queensland Agricultural Journal" for December, 1930.[3]

The experience has been that the pruning and spraying operations carried out for the control of brown spot will result in a satisfactory control of powdery spot also. The recommendations made in the case of the former disease are as follows:—

(1) Train the passion vine in a systematic manner from the start, making sure that the main runners are kept well tied to their respective wires, as this facilitates subsequent pruning.

(2) Prune back laterals at least once a year, either before the flowers for the summer crop have formed, if a summer crop is desired, or later if the intermediate and winter crop is most favoured. A further trimming may be necessary after the vines have begun to shoot.

(3) Follow the pruning with a Bordeaux spray of 6-4-40 or 4-4-40 strength. This spraying should be repeated once a month until the end of January, and then once every six weeks or two months until next pruning time. When mature fruit are on the vine, ammoniacal copper carbonate may be substituted for the Bordeaux.

For powdery spot the Bordeaux spray must be present during the cooler months from April to August at a time when applications for the control of brown spot are not usually necessary. Special attention should be paid to the young foliage and fruit which are the portions of the vine susceptible. Hence the outer rather than the inner portions of the vine need careful attention while spraying. Young vines up to two years old being specially subject to damage by powdery spot need more attention than do older plants.

It is inadvisable to prune passion vines during periods of dry weather, as extensive dieback may result under these conditions.

Another word of warning is necessary to those growers who have the disease known as woodiness in their plantation. This disease, characterised by the production of small, hard, and usually deformed fruit and a mottled and crinkled condition of the foliage, is of the virus type, and is capable of being transmitted from plant to plant on the pruning knife or even the hand. It is therefore essential that any plants showing symptoms of this disease should be cut off at the base and allowed to die out before pruning is commenced. The hands and any implements having touched a woody vine should be washed well in soapy water before passing to a healthy vine.

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[2] COBB, N. A.—Letters on the diseases of plants: Agric. Gaz., N.S.W., 1903, xiv., 973.

[3] SIMMONDS, J. H.—Brown spot of the passion vine, Queensland Agri. Journ., 1930, xxxiv., 564-585.

IMPORTATION OF MAIZE—A PROTEST.

The Minister for Agriculture and Stock (Mr. F. W. Bulcock) announced recently that he was keeping in close touch with the movement for the importation of maize into the Commonwealth. There is evidence that approach has been made to the Federal authorities with that object in view. Mr. Bulcock, in communicating with the Federal Minister directly concerned, requested that the prohibition against the importation of maize and by-products from overseas shall be continued at least until such time as the supplies of maize within Australia are absobed.

The matter is of considerable importance to Queensland as the farmers of this State, under normal conditions, produce maize in greater quantity than growers in any of the other States. Throughout Southern Queensland the maize crop of last season was seriously affected by an unusually dry summer. Similar conditions prevailed in New South Wales. The Atherton Tableland crop, above average in tonnage, will, however, go a long way towards meeting Australian requirements. Harvesting is well advanced, and it is obvious that no importation of this cereal should be allowed until such time as the supplies within Australia are utilised.

At present, there are sound economic grounds for opposing any suggestion to import grain. Australia to-day is not in a position, financially, to engage in the importation of maize or any other commodity while supplies of same are available within the Commonwealth, and thereby help to create an adverse trade balance, particularly as the grain imported would probably be the product of coloured labour.

Farmer organisations, such as the Provisional Maize Board and the Atherton Tableland Maize Pool, have protested to the Minister against the suggestion to lift the maize embargo at this juncture.

THE PIG FARM.

ACCOMMODATION AND EQUIPMENT.

By L. A. DOWNEY, H.D.A., Instructor in Pig Raising.

When the pig is considered as a pork-producing machine, it is apparent that the machine must be kept in perfect working order, that is, in good health, if it is to work up to its full capacity, and one of the first essentials to good health in pigs is comfortable and clean accommodation. Pig-raisers will welcome Mr. Downey's practical notes on an important subject.

PLANNING THE PIGGERY.

MUCH inconvenience may be prevented if the piggery is carefully planned before operations are really begun, and following are some of the important points which should be considered:—

1. *Sufficient Enclosures to Keep the Stock under Control.*—Even the best pigs are liable to become a nuisance if they are not secured in proper enclosures, therefore good fencing is the first essential on a pig farm, but it should be remembered that well-bred and well-fed pigs are not nearly so restless as wild or badly fed pigs; also, the farmer should remember that the pig is naturally a grazing and foraging animal, and when it is given ample space to graze and exercise it is not so likely to try to break fences as when it is confined to too small an area; therefore, *the larger the paddock the less substantial the fence required to keep the stock secure.*

2. *Comfortable Housing for Stock.*—Climatic conditions in Queensland vary considerably during different seasons and in different sections of the State, and the accommodation required for stock must vary accordingly, but, on the whole, the climate is comparatively mild, and therefore elaborate housing is not essential to keep stock warm during winter or cool during summer, but, nevertheless, suitable housing to protect pigs from weather extremes is certainly essential and is recommended.

3. *Food and Water Supplies.*—The nature and source of the food and water supplies for his stock will largely influence the pig-raiser when planning his piggery.

4. Convenience for working the piggery must be carefully considered, together with physical features of the available land. Labour-saving appliances should be added wherever possible.

5. Finally, the cost of construction must be carefully watched at all times. While it is advisable to provide accommodation to safeguard the health of the pigs and to keep them producing to the best of their capacity, one must not be extravagant in the provision of accommodation, otherwise the animals will have to bear a heavy overhead charge which will consume too much of the returns.

Contrary to the old idea that the piggery was necessarily an objectionable and unsightly section of the farm, the pig accommodation can be made attractive and quite inoffensive with comparatively little expenditure, provided it is carefully planned along proper lines.

The type of piggery to be constructed will be determined by the locality, the extent of the pig-raising operations, the available land, the food supply, and time and capital available. Most pig farms in Queensland can be classed under the following headings:—

(i.) Agricultural and dairy farm piggeries, which comprise the greater proportion of the total.

(ii.) Suburban piggeries on much more expensive land.

(iii.) Slaughter-yard piggeries, usually situated on soil that is not very productive from an agricultural point of view.

(iv.) Buttermilk piggeries: these are always associated with butter factories.

Photo. by courtesy of Principal, Dookie Agricultural College, Vic.

PLATE 43 (Fig. 1).

Pigs are most contented and healthy when allowed the range of succulent pasture paddocks.

LEGISLATION.

Pig raising is controlled to some extent by legislation under the Dairy Produce Act, Diseases in Stock Act, and the Slaughtering Act, and the by-laws of city, municipal, and shire councils. While it is advisable when about to construct or alter a piggery, to consult the authorities concerned, through the district inspectors under the Acts, it might be stated here that the general purposes of the legislation in force are to provide for health and sanitation on the premises where pigs are kept. They do not aim at hindering progress, or at increasing the cost of production.

The Value of Grazing Pigs.

The advantages of grazing pigs are—

(1) The pig lives in a more natural state.

(2) The pig enjoys sunlight, fresh air, and exercise, all of which assist in promoting good health.

(3) Living under clean conditions, the pig is contented, and its attendant is more contented in his job.

(4) If the grazing is good, the pig will obtain a portion of its food and may be encouraged to do part of its own harvesting.

(5) There is less risk of the pig suffering from deficiency of minerals or vitamins.

(6) By rotational grazing, and cultivation of pig paddocks, disease and parasites are kept in check, and the soil is fertilized. Rotational grazing on cultivation paddocks is one of the most practical sanitary precautions in the control of round worms and kidney worms, which are the cause of serious losses to the pig industry.

(7) It is easier to produce a lean, fleshy baconer or porker on pasture than in a small bare pen. Avoid the overfat pig.

Bearing these points in mind, every effort should be made in planning a piggery, to have ample grazing room for all pigs.

Plate 44 (Fig. 2).

A well laid out piggery where the pigs have lucerne paddocks to graze over and small shelter huts are provided.

Agricultural and Dairy Farm Piggeries.

Most dairy and mixed farmers keep at least a few pigs, while some make pig raising a fairly large and specialised section of the farm, hence the necessary accommodation must be determined by the extent of the operations.

It is most important in planning a piggery, to survey the extent to which the pig section of the farm may expand, and then to plan the whole undertaking on a definite system, because, without system, the piggery will be a disastrous muddle. The farmer should estimate the number of breeding sows he is likely to use and the accommodation required for that number, also a boar and the young pigs up to the porker or baconer stage. Also an estimate should be made of the area of land required to provide grazing and other feed for those pigs. The pasturage required per pig will, of course, vary according to the size of the animals, and the quantities of other foods, such as milk and grain, which are available for feeding to the pigs.

In selecting a site for the piggery, consideration should be given to the aspect so as to provide shelter from the prevailing winds, and to make the best use of the early morning sun as a disinfectant and deodoriser inside the sheds; thus a north-easterly aspect will usually be found the most suitable for pig accommodation.

It is an advantage to have the pig paddocks on a slope to provide surface drainage. It is required by the Dairy Produce Act that the piggery should be situated at least 150 feet from dairy yards and buildings. Where separated milk is to be used for pig feeding, the farmer should endeavour to have the piggery and dairy so situated that the separated milk may be conveyed down a line of open gutter piping from the separator-room to the piggery so as to save unnecessary labour which would otherwise be involved in carrying or wheeling the milk to the pigs.

The available water supply, shade, and proximity to cultivation land are other points to be considered.

Although it means economy in fencing to have square paddocks where pigs have to be fed in their respective paddocks, it would mean carrying the food too far to each trough, and for this reason the piggery will be more conveniently managed if long, narrow paddocks are provided. Long narrow paddocks are more suited to hurdling off, if it is desired to run the pigs on a portion only of the paddock. The paddocks should be large enough, however, to allow easy entrance of farming implements.

The plan shown in Fig. 3 is a suggestion for a piggery layout suitable for many dairy and agricultural farms in Queensland. Such a piggery is suitable for six brood sows, a boar, and the progeny up to six months of age. It must be understood, however, that this area of land will only provide grazing for this number of pigs if the pigs are supplied with such foods as milk, grain, &c., or if the paddocks are planted with crops producing heavy yields.

One of the best pasture grasses for pigs suitable for a wide variation of climatic conditions is Kikuyu grass. It is a palatable and nutritious grass and when properly established will stand a lot of grazing and rooting by the pigs.

The system aimed at in the plan shown in Fig. 3 is to have the six brood sows divided into three lots of two, having two sows to farrow every two months. This can be fairly well regulated when the boar is kept in a separate run and it gives more control over the breeding and provides a regular supply of pigs throughout the year, particularly when fodder crops are grown regularly to supplement the milk supply.

Although the shelter sheds shown in this plan are double sheds with a dividing wall, individual sheds, either fixtures or movable, built on skids, could be used. Concrete feeding floors with set-in troughs are shown, but these could be replaced with well-made movable wooden troughs and feeding floors.

The plan shows the pig runs opening out into a lucerne paddock which could at times be grazed off by using a temporary fence to hold the pigs on a small section of the crop. The 16-foot laneway and loading race, at one end, together with the movable hurdles shown in the plan, are necessary for convenient handling of the pigs for drafting and loading.

Suburban Piggeries.

In close proximity to cities and large towns are piggeries maintained on commercial lines where the waste foods and products from hotels, boarding-houses, shops, markets, and similar places are put to good use as pig food. Similar piggeries are also operated in conjunction with institutions such as colleges, hospitals, sanatoriums, and asylums.

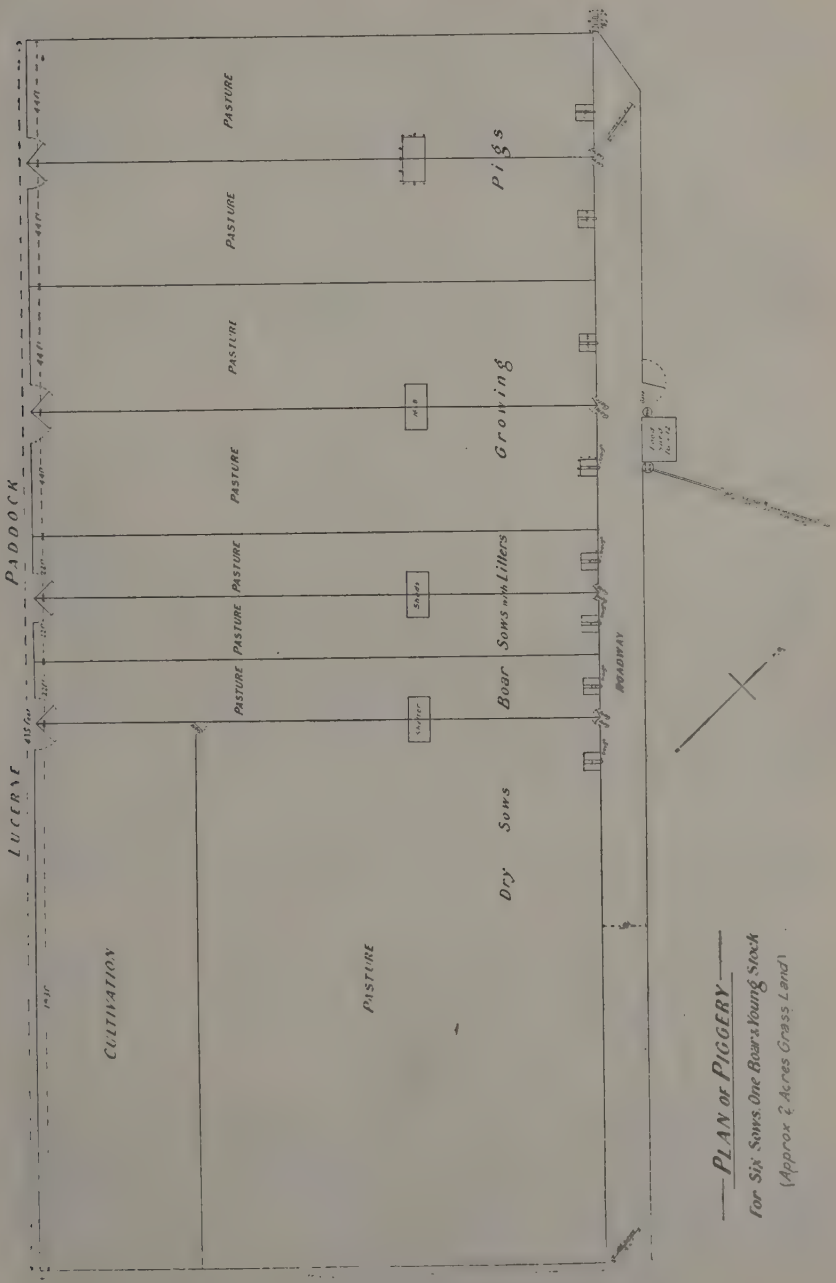


PLATE 45 (Fig. 3).

At such places land values are usually high and good cultivation and grazing land is not always available, hence for these reasons stock at such piggeries are usually kept on an intensive system in well constructed pens and sheds which cover a comparatively limited area of ground. Even under this system of pig raising, however, limited grazing is often provided, and if properly managed should prove profitable.

Conveniences for cooking the food must be provided at piggeries where garbage is fed; and, of course, this particular system of feeding necessitates special layout of pens, feeding troughs, and floors. When pigs are confined to small areas in such a piggery it is essential that the floors of the pens should be impervious to moisture and be well drained, while a plentiful supply of water for drinking and cleansing purposes is necessary.

Slaughter-house Piggeries.

Slaughter-house piggeries are somewhat similar to suburban piggeries in that the pigs are mostly kept on the intensive system, and therefore well-constructed accommodation is required. Impervious feeding floors and troughs are necessities. The Slaughtering Act requires that piggeries should be at least 240 ft. from the slaughter-house. Boiling appliances are also here necessary, as all offal and meat fed to pigs must be thoroughly boiled.

Butter-milk Piggeries.

Butter-milk piggeries derive their main food supply from butter factories, the milk usually being conveyed from the factory to farm by a metal or wood pipe-line, although sometimes the milk is carted in tanks or drums. Such piggeries usually carry up to 1,000 pigs.

On a piggery of this type where a large number of pigs are to be kept, it is necessary to economise in labour; hence the feeding arrangements should be conveniently arranged, and where a large number of pigs are to be brought together for feeding, it is desirable to have concrete feeding troughs and floors. Similarly, where large numbers of pigs are housed together on a small area, it is desirable that the floors of the houses should be of an impervious nature, preferably of brick and cement or concrete.

Where pigs are compelled to remain confined in pens with concrete floors it will be a great advantage to provide a wooden sleeping platform, where the animals may camp and be comparatively free from danger of rheumatism and pneumonia, which often occur when the animals are forced to lie on concrete during cold and damp weather. The wooden platform should cover a portion of the concrete floor sufficient to allow of all pigs sleeping thereon, and may either be a movable section or it could be made of 1½-inch flooring set in the concrete and tarred over.

Although a central type of pig-house is usually erected at butter-milk piggeries, the paddock system with individual houses could, in some cases, be adopted with advantage, provided due provision is made for a system of feeding troughs which can be maintained in a sanitary condition.

Quarantine Pen.

It is advisable to provide a quarantine pen some distance from other pens, where newly introduced pigs and sick pigs could be placed and kept under observation. This is an important safeguard against disease.

SHEDS.

There are numerous types of sheds suitable for different piggeries, and the type most suitable to a particular farm will have to be determined by the farmer, and conform with his local conditions. Certain requirements are general in all piggeries. A shed suitable to use for a sow and litter or about ten growing pigs, or a boar, or about four brood sows would need to have a floor space of approximately 8 feet by 8 feet, but extra space in a shed is an advantage; also with larger sheds, temporary partitions can be used to provide a number of separate sections. The height of pig-houses should be sufficient to allow a man to move about inside without difficulty; nothing under 5 feet is satisfactory.

Considering Queensland's warm climate, ample provision should be made for ventilation, and yet there should be no cracks about the lower portions of the sheds to allow direct draughts to blow on to the pigs and cause chills.

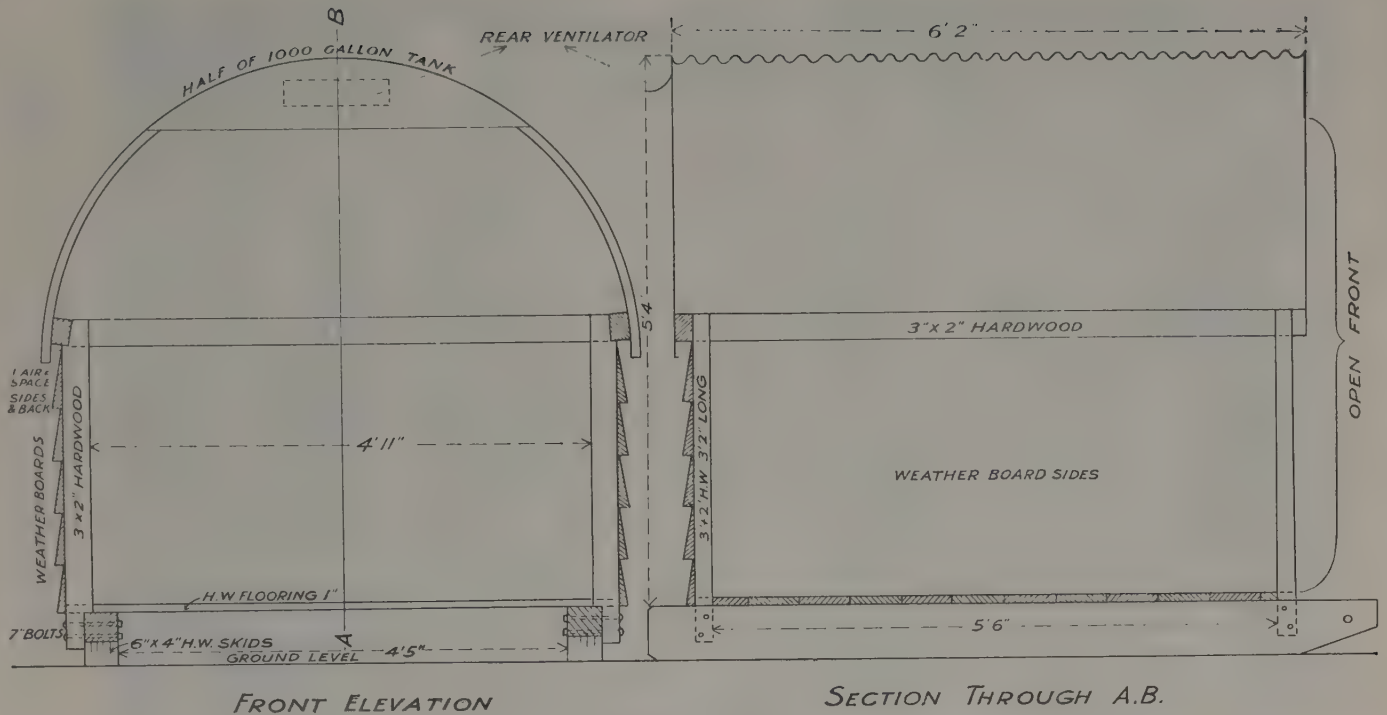


PLATE 46 (Fig. 4).

Plan of a portable shelter shed, using half a water tank. Note skids on which this shed is constructed, providing for ready means of moving the house when required.

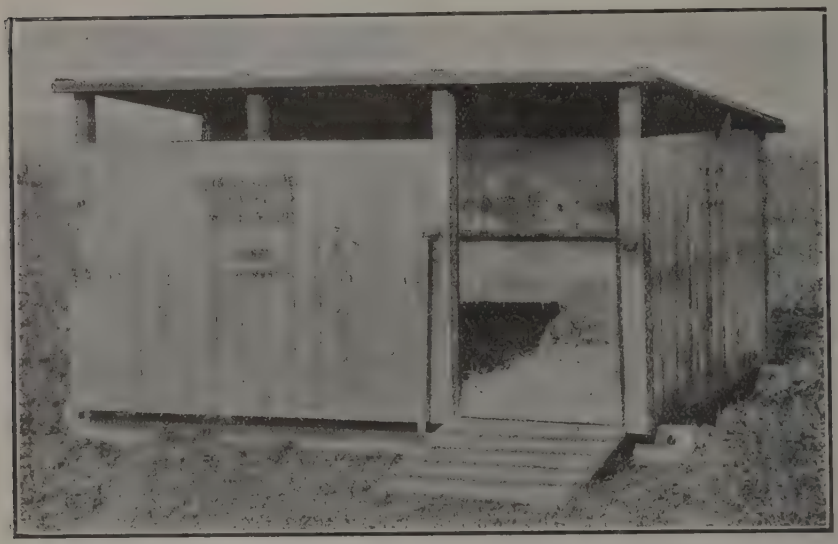


Photo. Ministry of Agriculture and Fisheries, Pig Keeping Publications, London.]

Plate 47 (Fig. 5).

Portable pig shed photographed on an English farm. A convenient type for Queensland conditions.

Plate 48 (Fig. 6).

An open-fronted shelter shed which suits Queensland conditions.

It is advisable in planning pig-houses to so arrange walls and doors as to have direct sun rays into every part of the floor where practicable, and for this reason, the open-fronted shed faced to the north-east can well be recommended. In some particularly wet districts, however, it may be necessary to have the front of the shed partly closed in to prevent drifting rains from wetting the sleeping floor.

In selecting materials for building pig-houses, the costs of various suitable materials will largely influence their choice, but in general corrugated galvanised iron roofs, wooden walls, and floors of concrete and wood or wood alone will be found most satisfactory.

Single Sheds and Portable Sheds.

When the single shed is to be used in pig paddocks (see Figs. 4, 5, and 6), the best method of building it is to put it on runners, that will serve a double purpose of keeping the floor boards up off the ground and also the runners can be used as skids; thus the shed is portable, and could be hauled about the farm with a team of horses or a tractor. This practice has many advantages, and, for most Queensland pig raisers, this type of single portable house will be found the most serviceable.

Plate 49 (Fig. 7).

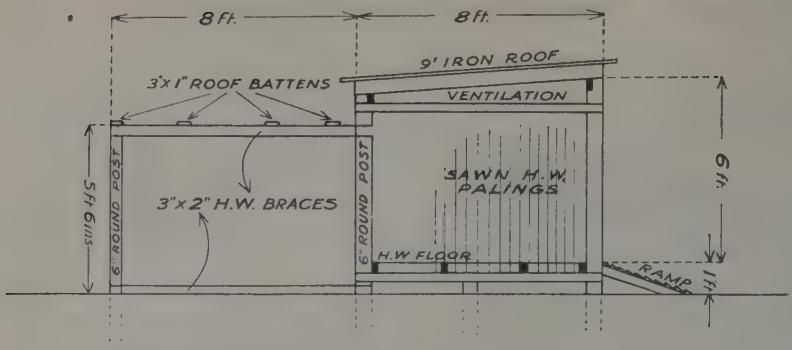
Double Pig Shed, divided by fence, at the Hawkesbury Agricultural College, Richmond, N.S.W. Note also the well-constructed fences and shade trees for comfort of stock.

Portable houses can be moved from one paddock to another when crops are being grazed off by pigs, and the shed can easily be removed from one part of a paddock to another in order to sweeten up the ground or to allow cultivators to work.

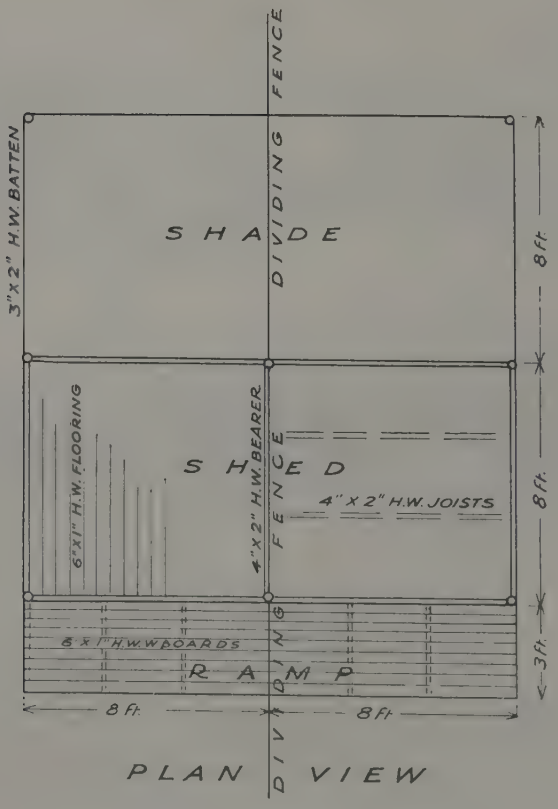
Double Shed.

This type of shed, as shown in Figs. 7 and 8, is very useful under the paddock system; it is easily constructed and, where the paddocks are large, there is no necessity for special drains with this shed; this also applies to the smaller single sheds. If it is necessary at any time to lock pigs in the open-fronted shed, a temporary hurdle can easily be erected along the front.

Pig-houses with wooden floors should have the floors built from 6 to 12 inches off the ground in order to keep them dry, and so that the ground under the floors may be kept sanitary.



END ELEVATION



PLAN VIEW

OPEN FRONTED SHELTER SHEDS FOR PIGS
Being a Double Shed with a Dividing Fence
Ramp in Front and Brush Shade at Back

Plate 50 (Fig. 8).

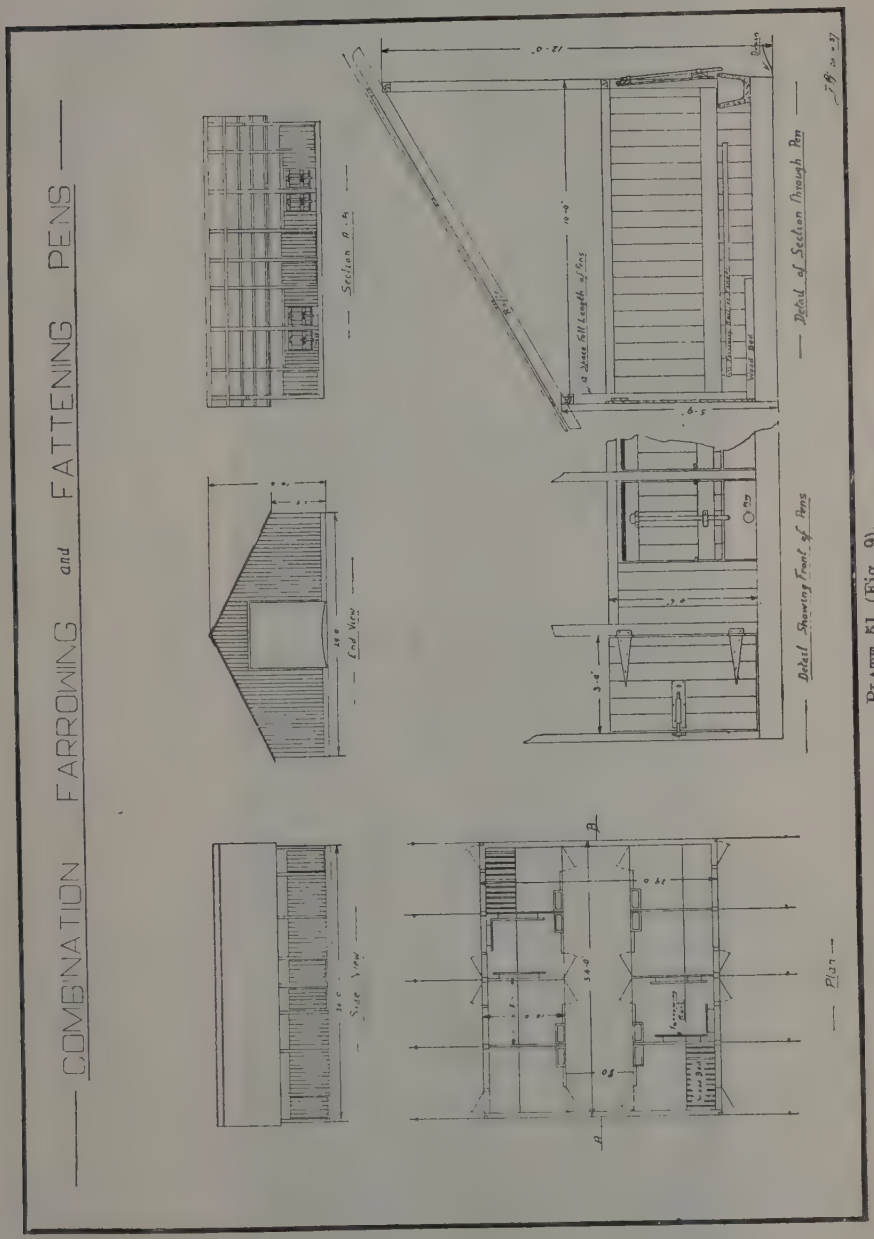
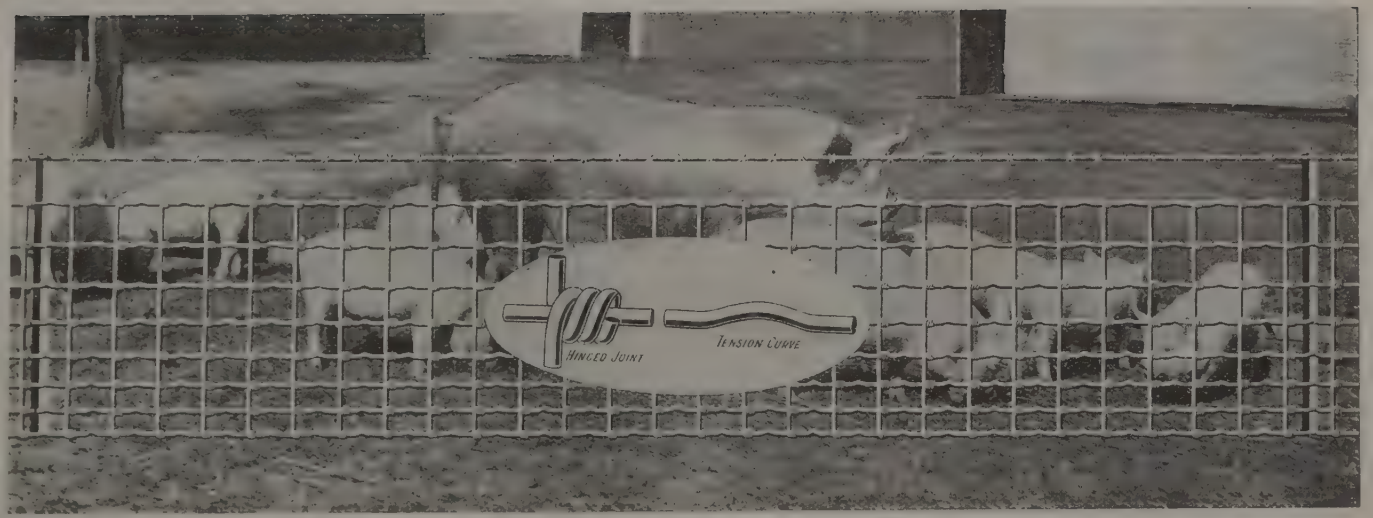


PLATE 51 (Fig. 9).

This type of Piggery is suitable for suburban farms with a good water supply.



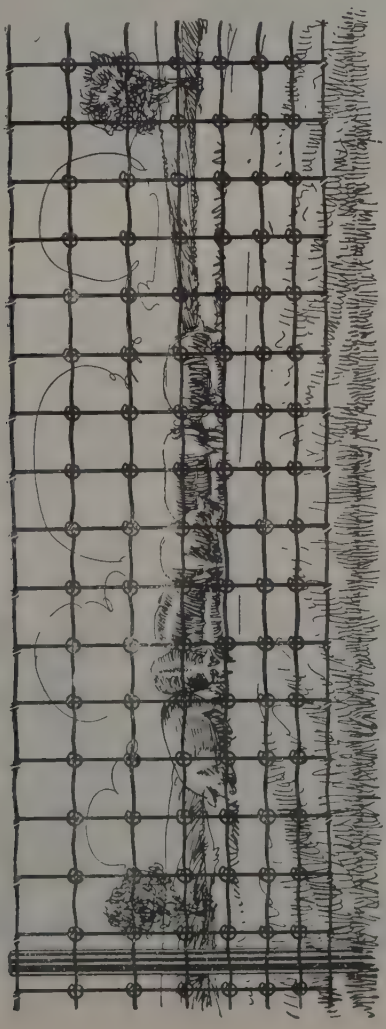
By Courtesy of Buzacott's Ltd.]

PLATE 52 (Fig. 10).
Hinged joint woven-wire, 32 inches high.

Central Pig-Houses.

These are found to be most suitable for butter-milk piggeries, slaughter-house piggeries, and suburban piggeries. Fig. 9 illustrates this class of building, which is of a more solid and permanent structure than small individual houses. In this type of pig-house where large numbers of pigs are to be fed, impervious floors, preferably of concrete with wooden sleeping platforms, are essential. There should be a sanitary drainage system, and all drains should be shallow, smooth, and free from corners, and open to the sunlight; also the drainage must be delivered away to where it will not cause a nuisance.

In the large central pig-houses where there is continual dampness around the feeding troughs, the use of concrete walls is very beneficial, as they withstand the moisture much better than do wooden walls.



By Courtesy of Queensland Pastoral Supplies, Ltd.]

Plate 53 (Fig. 11).

Ringknot Woven-wire Pig Fence (8 lines), 30 inches high.

Plate 54 (Fig. 12).

Straight saplings can be put to good use in pig fencing.

Plate 55 (Fig. 13).

Another durable pig fence.

Guard Rail.

All farrowing houses should be fitted with a guard rail to prevent young pigs from being crushed against the walls. Experience has proved that the use of this rail has saved an appreciable percentage of young pigs. This rail can be constructed of 3-inch by 2-inch hardwood, 1-inch water piping, or saplings. It should be placed 9 inches above the floor and 7 inches from the walls.

FENCES.

The class of fence to be used on each farm will be governed mainly by the available material for its construction.

Pig fences need to be from 2 feet 6 inches to 4 feet in height, depending on the class of pigs to be enclosed. Large boars and sows sometimes have a tendency to jump fences, and for such animals a 4-foot fence would be necessary; however, a fence 3 feet high is usually sufficient to control pigs of all sizes, while young pigs are usually kept in their places by 2-feet 6-inch fences. To overcome this difference in the required heights of fences, posts should be 4 feet out of the ground so that the height of the fence may be raised to 4 feet, if necessary, by the use of extra barbed wires.

With pig pens, it is a fairly constant rule that the smaller the pen the more substantial the fences must be, the reverse also holds. It is usually advisable to have a line of barbed wire, either on the ground level or a few inches below to prevent pigs from rooting under fences; logs or stones can sometimes be used for the same purpose.

The panels of pig fences should never be more than 10 feet, and 8 feet would be better. Several types of fences are satisfactory under certain conditions.

Perhaps the most satisfactory fence for pig paddocks is woven wire, which can be purchased at reasonable prices from hardware stores. Woven wire is made in various designs and especially for pig paddocks. The height of woven pig wire is about 2 feet 6 inches; this is sufficient for young stock, and if it is desired to increase the height of the fence, extra barbed wires may be placed above the woven wire.

Post-and-rail fences are most serviceable for large pigs, and can be made proof against small pigs by the addition of wire netting 18 inches high. This fence, however, is only suitable where timber is available cheaply.

Posts and wire netting alone seldom make a good fence except for weaner pigs, as the wire sags and is easily torn by large pigs. However, wire netting of stout gauge is useful in reinforcing other fences, such as ordinary cattle fences, to make them pig-proof.

The post and two-rail fence covered with split or sawn palings is suitable for some piggeries. The palings should be strapped on with hoop iron at the top and bottom. As is the case with all wooden fences, there is a danger of fire and white ants. The paling fence has the advantage of acting as a break-wind in the piggery.

The other type of paling fence (see Fig. 13), where either sawn or split palings are used and are held in position between two interwoven plain wires at the top and bottom of the posts, is very common and very useful where timber is plentiful. Saplings or slabs may also be used in the same way, interwoven with two wires top and bottom.

A fence made of seven barbed wires suitably placed on the posts is satisfactory for adult pigs, but it is objectionable where young pigs are penned, as a scratch from barbed wire shows up as a disfiguration on the carcass.

Where wire fences are used it is advisable to either reinforce them or replace them by wood at the feeding end of the paddocks as there is most wear and tear on this part of the fence.

TROUGHS.

The piggery should be equipped with troughs of sufficient capacity to feed the pigs without undue scrambling or fighting at feeding time—that is, sufficient space should be provided at the trough for each pig; an average space of 10 inches should be allowed for adult pigs. The troughs should have the capacity to hold a full feed for the pigs.

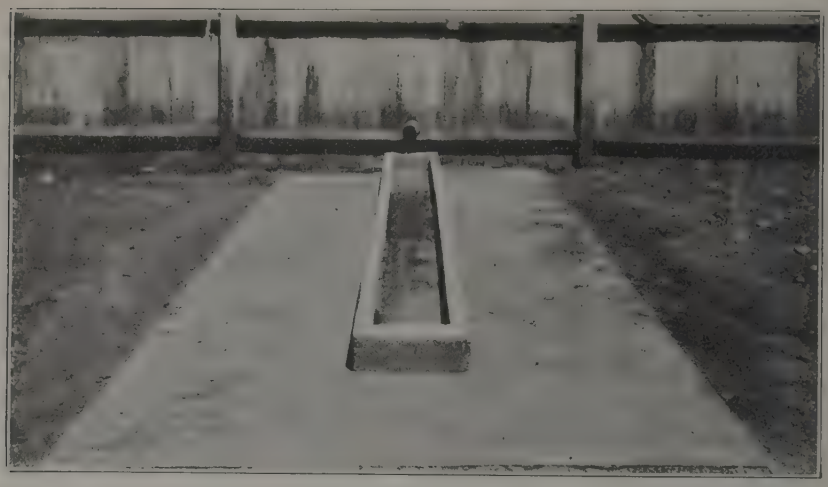


Plate 56 (Fig. 14).

Concrete food trough and platform.

Plate 57 (Fig. 15).

Breakfast is served. A handy V-shaped wooden trough.

Pig troughs should be strongly constructed and have a smooth surface free from corners or cracks. Where portable troughs are made they should be of a size which allows of their being easily carried on to clean ground. With stationary troughs it is essential that they should be built on to a floor of concrete brick or timber to prevent the pigs from making an objectionable mud wallow beside the trough. Wooden slabs placed on the ground beside the feeding trough are very unsanitary, even if they do keep the pigs out of the mud. Spilt food and drainage collects under the slabs and causes an objectionable odour. The feeding floor should always be of an impervious nature.

The most serviceable troughs are of concrete built into a concrete floor as shown in Figs. 14 and 17.

The trough illustrated in Fig. 14 is 14 feet in length and the width is 15 inches overall, having its sides of 2½-inch thickness, reinforced with barbed wire, lengthways. The trough is 5 inches deep and the inside width is 10 inches. The platform is 7 feet wide and 16 feet long and 4 inches in thickness, and is surrounded by a protective flange 4 by 2-inch hardwood, bolted together at the corners to protect the edges of the platform from being broken away.

Plate 58 (Fig. 16).

A Woven Wire Pig Fence.—Note the wooden creep for feeding young pigs apart from the sow. This creep is so constructed that the suckers can get into the feeding pen, but the sow is blocked out; this permits of the suckers being fed a little extra food prior to weaning.

Improvements could be made to such a trough by having a bung in the end leading outside the pen to facilitate cleaning the trough. Also, if the end of the trough projects outside the fence, food could be poured in from the outside. Iron bars of ½-inch thickness set into the concrete across the trough 10 inches apart prevent the pigs from fighting at the trough and also prevent pigs from rooting food out of the trough. In such a trough it is preferable to have all the internal corners rounded off in order to facilitate cleaning.

The V-shaped wooden trough, as illustrated in Fig. 15, is very useful when concrete cannot be used. This type of trough can be made of varying sizes to suit requirements. One suited to general use is made of a 9-inch by 1-inch hardwood board and an 8-inch by 1-inch hardwood board secured by screwing or nailing together at right angles, and the ends closed up by 9-inch by 1-inch boards. The

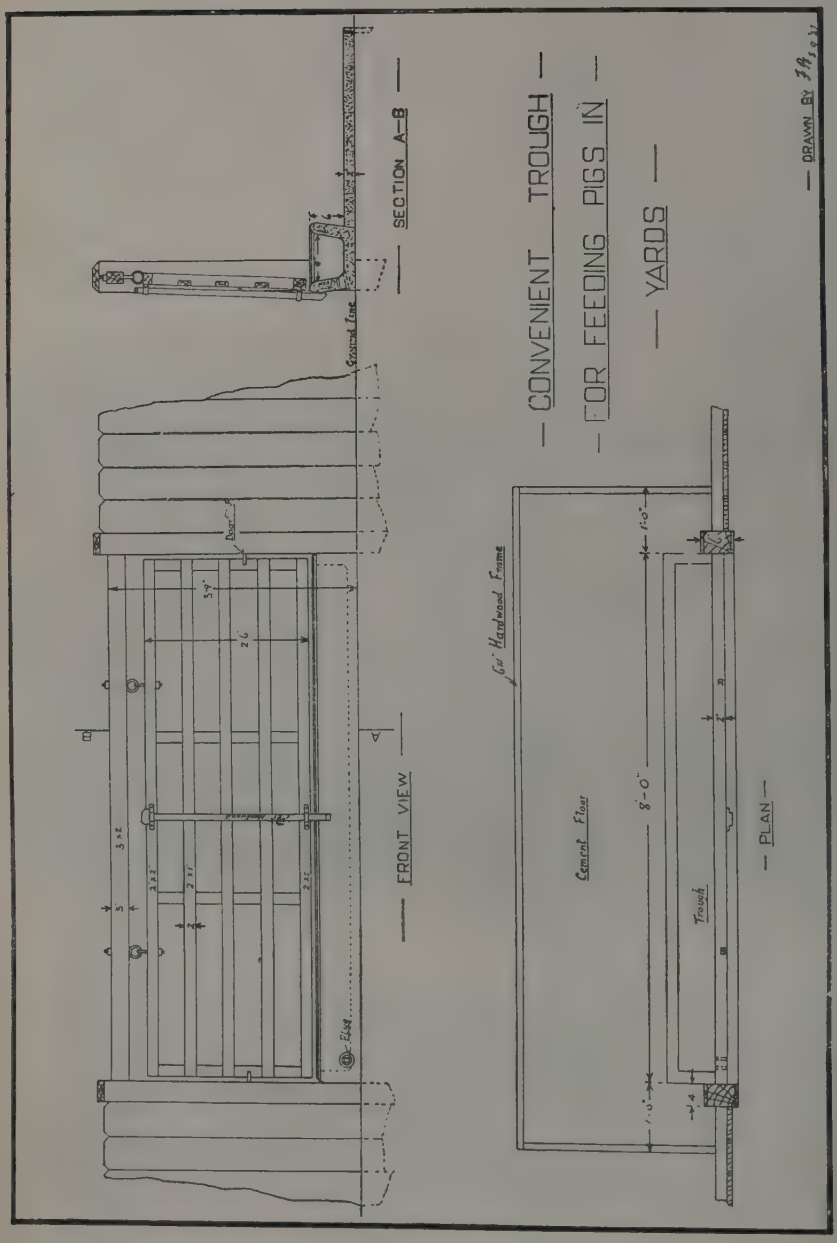


PLATE 59 (Fig. 17).

timber must be sawn and tightly fitted to prevent leakages. A dressing of tar inside and out acts as a preservative of the wood, and also makes it watertight and more hygienic. Such a trough built on a movable wooden platform is most convenient for paddock use.

Cast and galvanised iron troughs of various designs are procurable from hardware stores, and these are satisfactory under certain conditions.

SELF-FEEDERS.

Self-feeding of pigs is as yet little practised in Australia, mainly because pigs are kept chiefly to utilise by-products, such as separated milk, which are not readily adaptable to self-feeding; but when the price ratio of grain and pork is such as to make the pig a profitable means of disposing of grain, pig raising must be considered from a somewhat different viewpoint.

Plate 60 (Fig. 18).

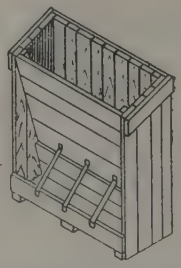
Baconers grown on the self-feeder in which was placed a mixture containing 80 lb. maize meal, 10 lb. lucerne chaff, and 10 lb. meat meal. The pigs were also given unlimited supplies of water to drink.

The grain grower who keeps pigs, but has no milk foods, can make good use of his grain by feeding it in combination with such feeds as lucerne chaff and meat meal, both of which are substitutes for separated milk in the pig's ration. Such feeds as these are adaptable to dry feeding through a self-feeder whereby the pigs have several days' food supply placed in the feeder and they are allowed to help themselves.

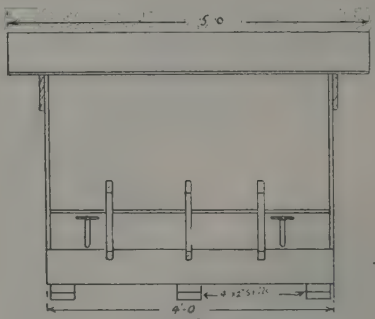
Under certain conditions self-feeding has many advantages and is worthy of further trial.

Figs. 18 and 19 illustrate a type of self-feeder which has given satisfactory results in practice.

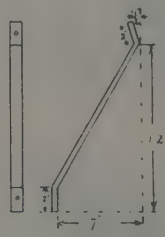
ONE WAY SELF FEEDER FOR PIGS



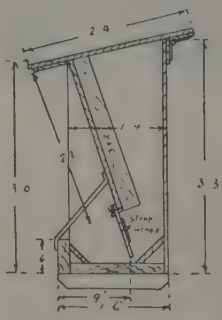
Perspective with Roof Removed



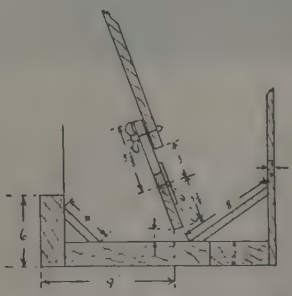
Front Elevation



Detail of Iron Strap



Section



Detail of Slide and Hinged Flap

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PLATE 61 (Fig. 19).

ONE-WAY SELF-FEEDER FOR PIGS—MATERIAL REQUIRED.

(PLATE 61, Fig. 19.)

Members.	Number.	Length.	Size.	Material.
Skids	Three	1 ft. 6 in.	4 in. x 2 in.	Hardwood
Trough	One	4 ft.	6 in. x 2 in.	Pine
Trough	One	3 ft. 10½ in.	12 in. x 2 in.	Pine
Trough	One	3 ft. 10½ in.	4 in. x 2 in.	Pine
Trough	One	3 ft. 10½ in.	8 in. x ¾ in.	Pine
Trough	One	3 ft. 10½ in.	4 in. x ¾ in.	Pine
Front Panels	Five	3 ft. 10½ in.	6 in. x ¾ in., T. & G.	Pine
Front Panels	Two	2 ft. 3 in.	3 in. x 2 in.	Pine
Sliding and Hinged Flaps	Two	3 ft. 10½ in.	4 in. x ¾ in.	Pine
Ends and Back	Twenty-four	3 ft. 3 in.	6 in. x ¾ in., T. & G.	Pine
Ends and Back	One	7 ft.	6 in. x ¾ in.	Pine
Top	Ten	2 ft. 4 in.	6 in. x ¾ in., T. & G.	Pine
Top	Two	5 ft.	6 in. x ¾ in.	Pine

Hardware.

Three 1-inch by ¼-inch iron straps.

Six 3-inch strap hinges.

Two 3-inch by ½-inch bolts with thumb nuts.

Nails, &c.

PLATE 62 (Fig. 20).

Pig yards well shaded and sheltered with pepperina trees.

Shade.

Pigs should be provided with ample cool shade in hot summer months, and this can be done either by planting shrubs or hedges or by building a framework of 3-inch by 2-inch hardwood and covering the top with bushes or thatching it with grass. Where a clump of natural scrub can be left in the pig paddock, good shade is provided where the pigs can burrow away into the cool and find comfort during the hottest part of the day.

PLATE 63 (Fig. 21).

A useful portable loading race.

PLATE 64 (Fig. 22).

A well constructed and serviceable pig shed and run used by two Queensland Pig Club boys.

Oiling Post.

An occasional application of oil to the pig's skin keeps it in soft and healthy condition, and at the same time the oil destroys lice and other external parasites on the pig. A convenient self-oiler can be made by wrapping a bag or a rope round a post or a tree in the run from the ground level up to a height of 2 feet, the bagging or rope is kept saturated with oil, and the pigs oil themselves by rubbing against the post. A mixture of six parts of waste oil and one part of kerosene is suitable for oiling pigs.

Weighing Pigs.

As both pork and bacon pigs are usually sold on a basis of weight and quality, and as the ruling price paid per lb. varies according to specified weight limits, it is important to the pig raiser that he should have a fairly accurate knowledge of the weight of his animals before they are offered for sale.

Plate 65 (Fig. 23).

A wooden crate suitable for weighing pigs. Note the strong construction, "slide-up" doors at both ends, and wires coming from bottom of crate to be attached to hook of the spring balance. Softwood should be used in the construction of the crate so that its weight will not be too great.

On account of pig trucking days being two or more weeks apart in some districts, farmers are sometimes forced to market their pigs either too early or too late to have them at the most profitable marketing weights, but in very many cases a farmer is able to market his pigs to much better advantage when he is able to weigh them on the farm at regular and frequent intervals prior to trucking.

Even after years of practice, guessing the weight of pigs is not so reliable as weighing them, and where regular consignments of pigs are sent from a farm the use of weighing scales can be recommended, for, with intelligent use they will soon more than defray their cost in the saving of cash effected by marketing pigs at the most profitable weights.

The crate should be light, yet strong; a convenient size for a crate to hold one bacon pig is 3 feet 6 inches long, 2 feet 6 inches high, and 1 foot 6 inches wide (inside measurements).

If the weighing crate is arranged in a race, the pigs can be brought from their yard, weighed, and then returned to the yard conveniently.

There are many good methods of weighing pigs on the farm, and the most suitable method must be determined according to circumstances, but the suggestions given herein will be helpful to a large number of pig raisers. Special platform scales with a pig crate built on can be purchased at prices around £50, but at such a price their use must be limited to very large piggeries and trucking yards where large numbers of pigs are weighed.

PLATE 66 (Fig. 24).

Crate in position, ready for use with front door closed. Note the arrangement of the top beam, lever, and spring balance.

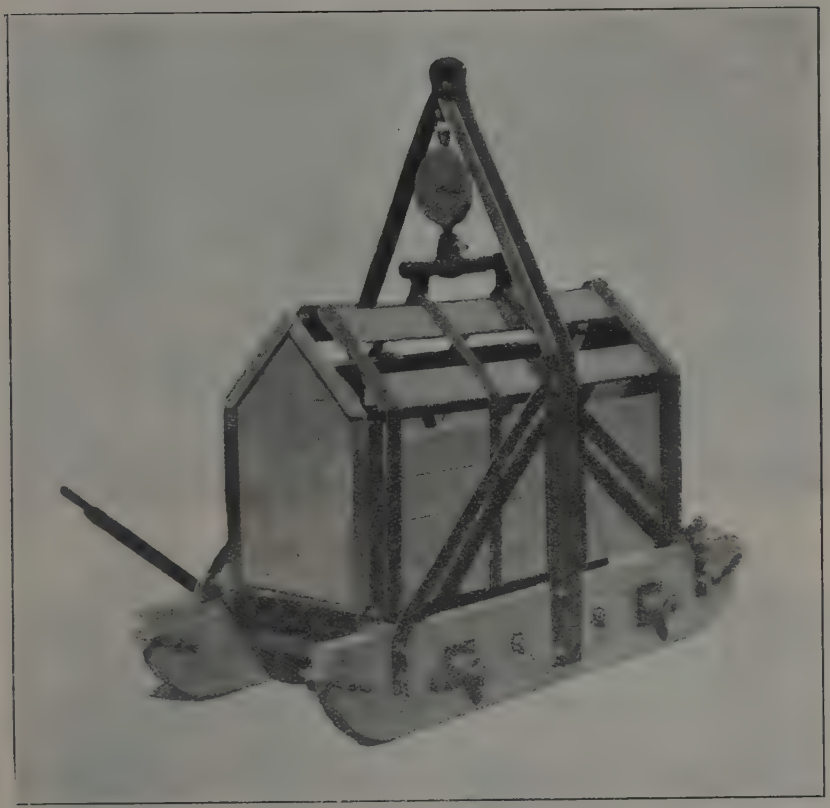

PLATE 67 (Fig. 25).

A movable weighing appliance for porkers and baconers, designed, constructed, and patented by the Forster Engineering Works of Brisbane. This weigher has been in use at numerous Pig Club shows in Queensland and has proved satisfactory. It is built on two skid runners; the iron lever on the side enables the crate to be suspended, putting the weight on to the spring balance which is hung on the top of the frame. The sliding bar below the balance allows the operator to adjust the balance if the pig stands at one end of the crate. The doors at both ends of the crate slide up at the top so that the pig may walk in at one end and out at the other.

Cattle at the Brisbane Show.

LAST YEAR'S CHAMPIONS.

PLATE 68.
Champion Polled Hereford Cow, "Lovely II." (S. A. Plant, Cooyar.)

PLATE 69.
Champion Polled Hereford Bull, "Explorer." (S. A. Plant, Cooyar.)

Plate 70.
Champion Guernsey Cow, "Caramana Dolly." (Mr. Ben Gillespie, Springsure.)

Plate 71.
Champion Guernsey Bull, "Tanto Golden Victor." (Mr. H. Nethercott.)

PLATE 72.
Champion Friesian Cow, "College Princess Pontiac." (W. Hickey and Sons.)

PLATE 73.
Champion Friesian Bull, "St. Atthan's Actuary." (W. H. Grams, Upper Tent Hill, Gatton.)

PLATE 74.
Champion Devon Heifer, "Lusty, 419." (R. A. Howell, South Killarney.)

PLATE 75.
Champion Devon Bull, "Baronet." (R. A. Howell, South Killarney.)

Plate 76.—Lady Rose of Gindie XII.
Awarded First Prize in the Beef Shorthorn Heifer Class six and under twelve months old. Exhibited by the Department of Agriculture and Stock.

Plate 77.—Gindie Master Stroke VI.
Awarded Second Prize in the Beef Shorthorn Class for a bull six and under twelve months old. Exhibited by the Department of Agriculture and Stock.

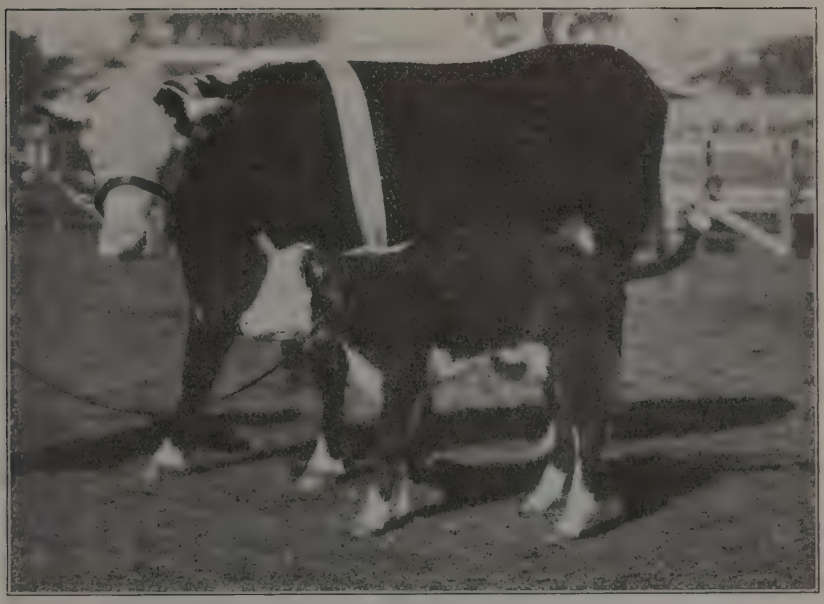

Plate 78.
Champion Polled Hereford Cow, "Lovely II.," with Calf. (S. A. Plant, Cooyar.)

Plate 79.
Champion Clydesdale Mare, "Jean Dale." (A. T. Creswick, St. Helen's.)

PLATE 80.

"Lady Dorothy of Calton" (4496) by "Sultane's Victor of Brooklands" (1057), dam "Lady Lass 4th" (993). Winner of the Martin Snelling special prize at the 1931 Brisbane Royal National for pure-bred cow producing the greatest quantity of butter-fat in 273 days (all breeds). She produced 12,009 lb. of milk and 649·86 lb. fat in that period, beating three Australian Illawarra Shorthorns and a Friesian in the class. Lady Dorothy is a seven-year-old cow, and was bred and is owned by Mr. John Collins, of Calton, Tingoora.

DAIRYING IN QUEENSLAND—I.

By C. F. McGRATH, Supervisor of Dairying.*

IN my review of the 1930-1931 period it was said that the season had been a propitious one for the production of dairy produce and that the output was the largest in the history of the State.

At the opening of the period now reviewed climatic conditions were most encouraging, and favoured with early spring rains and the fact that the dairy herds generally had wintered well, an increase in production over the previous peak year was considered attainable.

During the first six months of the year a plentiful supply of grass and fodder crops was available for the dairy herds. Such favourable conditions were reflected in the output of butter and cheese during the six months ending December, 1931, which showed butter, 45,347,618 lb.; cheese, 6,325,163 lb.

As the result of a heat wave of unprecedented severity the pastures and fodder crops suffered serious damage, resulting in a marked decline in the output from the dairy farms.

Beneficial rains fell in the early autumn improving the prospects for the early winter period. Mild weather was experienced up to mid-June.

During the period reviewed the industry has made great progress throughout the dairying districts of Queensland, an outstanding feature of which is the development of the industry in the northern portions of this State. On the Tablelands and on the rich rain forest alluvial soils on the coastal belts development is proceeding along modern and efficient lines, as is reflected in the high quality of butter submitted from this area for export, 98 per cent. of which was choice and first.

Consignments of butter submitted for export by the factories of our northern tableland were not excelled by the products of any other portion of the State.

Statistics show that there has been a continuous increase in the output of butter during the past five years, as particularised:—

	Quantity. Lb.	Value. £
1927	59,978,181 ..	5,024,957
1928	71,162,096 ..	5,633,666
1929	74,790,973 ..	6,232,581
1930	87,554,244 ..	5,902,096
1931	97,602,853 ..	6,303,517

The quantity of butter exported during the past year approximates 73,000,000 lb. compared with approximately 71,000,000 lb. over the season 1930-31, representing a value of, approximately, £4,000,000 in the credit of the State's trade balance.

The output of butter over the period of five years represents a total of 391,088,347 lb., for a value of £29,096,817.

Great Importance of the Industry.

Dairy farming and pig raising occupies a position as one of the State's most progressive and important branches of primary production.

There are about 23,000 families deriving their living from the dairy farms, some thousands are engaged in the producing, manufacturing, handling, and marketing of dairy products, while the industry sets in motion and sustains many other activities, industrial and commercial, as exemplified in the many rural centres dotted throughout the dairying areas.

The sum invested in dairy farms, including stock, amounts to, approximately, £37,000,000.

There are fifty co-operative butter factories and four proprietary butter factories, as well as fifty-nine cheese factories in Queensland.

* In an address at the Annual Conference of the Queensland Butter and Cheese Factory Managers' Association, June, 1932.

The amount invested in butter factory buildings and plant represents a value of £1,696,408.

The average output per factory during the year was 14.5 tons weekly or 766.8 tons yearly, which compares favourably with any dairying country in the world.

The birth and development of the dairying industry in this State was encompassed within the lifetime of many members of the Association, who give evidence of a vitality that will enable them to give many more years of useful service to the industry.

A Pleasant Retrospect—An Impressive Prospect.

It is most pleasing to review the history of the industry in this State as it is compiled of chapter succeeding chapter recording substantial progress not alone in the volume and value of output, but also along lines of efficiency, thereby assuring the future advancement and stability of the industry.

In centres of rural activities up-to-date dairy factories have been erected and equipped with the most modern plant known to the dairy world.

The modern dairy factory stands as amonument of the progress and stability not only of the industry, but also of the business and general commercial activities associated with the district in which it operates.

The agricultural development of a district and its future prospects are definitely and most reliably reflected in the activities of its central co-operative dairy factory. Many hundreds of written and personal inquiries from land seekers are dealt with yearly by the dairy branch of the Department of Agriculture and Stock, all desiring definite information as to the location and operations of the dairy factories. The factory stands as a beacon light to the land seeker. The output of a factory is the barometer of land values and also of the stability of general trading and commercial activities in its neighbourhood.

The success of our primary industries, of which dairy farming is such an important section, is essential in the progress of the Commonwealth and the prosperity of its people.

The dairy farmer contributes largely to the revenue of the State and the Commonwealth. By exporting 4,000,000 lb. worth of dairy produce overseas he makes a valuable contribution to the State's exports.

There is room for a vast expansion of the industry in the State with its millions of acres of fertile lands still undeveloped.

If the future holds opportunities there is no reason why the output of dairy products should not double within a period of ten years, thereby greatly increasing the volume and value of our overseas exports and materially strengthening the State's overseas credit.

QUALITY OF THE PRODUCT.

Grading.

I feel sure that there is no need for me to explain the meaning of this word to members of the Association, and I do not think there is another word in the English language that has a greater significance to day for the dairy farmers and other primary producers than grading. Grading applies to so many other phases of primary producing activities that it would take some time to enumerate them all. I propose to deal with the finished product (butter), as delivered by our modern butter factories for home consumption and for export.

In modern dairy practice grading is an outstanding necessity whether applied to the producing, manufacturing, or to the marketing end. Neglect to carry out this essential activity would check the development of the industry along efficient lines and would end in its failure.

The examination, classification, and recording of defects in the finished product supplies the information necessary to investigate the source of defects through the producing, manufacturing, and marketing operations. Such investigatory work is essential to ascertain the causes that give rise to defects and locate those responsible, so that loss may be eliminated and permanent and lasting improvement achieved.

The chief characteristics which determine the grade of butter is its taste, aroma, flavour, body, and texture. Taste is the sensation given when the butter is taken into the mouth. It is often used as synonymous with flavour. It will assist the grader if he will confine the term taste to the sensations which are confined to the

mouth such as sweet, sour, salt, and bitter tastes. The term flavour combines the sensation of taste with that of smell. Aroma or odour is determined by the nasal organs alone.

Source of Flavour and Aroma in Butter.

High-grade butter possesses a pleasing, appetising taste, flavour, and aroma.

The chemical composition of the cream from which the butter is produced imparts a characteristic taste and flavour. The primary taste, odour, or flavour of a high-grade butter is on occasions supplemented by certain secondary tastes—flavours or odours foreign to a high-grade product such as acid, or bitter tastes, or unclean feed, or absorbed flavours and odours.

The secondary flavour may be of a volatile, aromatic nature and may be more or less discernible in the odour given off by the butter, such as strong food and absorbed flavours.

There are also flavours which are referred to by graders as after taste, which leave an unfavourable taste on the palate after the butter has been held in the mouth for some time or after it leaves the mouth. Such secondary tastes include those which are added to the primary taste of butter and are not influenced by feed.

Body and Consistency (Texture) of Butter.

The varying degree in which milk fats are subject to crystallization is one of the most important factors determining the body of butter. The composition of the butter-fat directly influences the varying liability of the milk fats to crystallization while the composition of the milk fat is influenced by the qualities of the food eaten by the producing cows.

Butter makers are familiar with the variation in the body of butter manufactured due to seasonal and fodder influences. The butter produced in certain months has frequently what is known as a weak body, while the product of other periods is firmer in body.

It is found that when cows are depastured on immature grasses and fodders that the body of the butter produced is weak; and a firm, good body is associated with the butter when the pasturage advances in maturity.

Results of investigations definitely indicate that the composition of milk fat is predominantly influenced by the qualities of the food consumed.

Analysis of succulent immature grasses show that they have a high nitrogenous and a low cellulose content, so that cows running on pasturage in this state of growth receive far too much nitrogenous matter and far too little cellulose. When the pasturage is advanced in growth there is a decrease in the albumen and an increase in the cellulose, and the butter produced becomes firmer in body. The feeding of cellulose in the form of wheat straw when cattle are on immature pasturage should improve the butter.

It is noticeable that stock that are turned on to immature fodder crops will consume dry maize stalks, wheat straw, and old dry grass in their desire to obtain cellulose.

Colour.

Milk, cream, and milk fat varies in colour from a pale white to a golden yellow. The depth of colour depends upon (*a*) the breed of the cow, (*b*) the kind of feed consumed, and (*c*) the quantity of fat and solids present.

The yellow colour of milk is due to the presence of the pigment carotin. Carotin is readily soluble in fat and it combines with the fat of milk and imparts the typical pale or deeper yellow colour. The depth of colour depends upon the quantity of pigment present in the blood when the milk is secreted. The pigment carotin also imparts colours to the body fats of sheep, cattle, and pigs. The body fat of fat stock depastured in certain localities of the State where feeds are high in carotin are of a deep golden colour. Seasonal variation in the colour of butter is due to the close relationship between the nature of the feed and the colour of the milk fat. In spring and summer the green grass and herbage on which the cows are fed are high in the pigment carotin, and the spring butter is of a high colour. During the winter when the feeds are dry in some localities the butter is pale in colour.

The proportion of the carotin in the feed retained in the body of the animal varies in the class of animal, individual animals, and especially with breeds of dairy cattle. The Jersey and Guernsey produce fat possessing a deeper yellow colour than animals of other dairy breeds such as Holstein, Shorthorn, and Ayrshires. The pigment as it occurs in milk fat so far as is known is identical chemically with that found in the plant.

Organisation.

As an aftermath of the war the worst economic and industrial depression the world has ever known caused many nations to alter their fiscal policy, and most of the leading countries adopted a policy of protective tariffs, disorganising trading conditions that held sway for centuries. To stabilise the industry it is necessary to protect it against dumping and unrestricted competition in the wholesale and retail sections. The influence of organised marketing through the agency of butter and cheese boards and the Dairy Produce Export Control Board has made for the betterment and advancement of the industry. The organisation pertaining to production and the application of the Equalisation Scheme to the butter section have rendered signal service to the industry. Strenuous efforts are being made by the members of the Cheese Board and all sections of the associated bodies to bring about the application of the Paterson and an Equalisation Scheme to the cheese section throughout Australia.

I have dealt with the progress chiefly in the manufacturing division of the industry. Time will not permit of my dealing with other phases of the industry. However, instructional and investigatory work is carried out by specially trained officers in all sections of the industry.

Much has been accomplished, much remains to be done, and through sustained co-operation of factory directorates and staffs with Departmental officers much greater benefit will accrue to the industry.

Photo: J. Davies.]

PLATE 81.—A MODERN MARANOA DAIRY.

An interesting view on Mrs. Cressard's Dairy Farm, near Roma.

FRUIT CASE DESIGN AND CONSTRUCTION.

IN a note on maturity standards of citrus fruits in our last issue the dimensions of the Canadian standard case were given as 18 inches long, 10½ inches wide, and 11½ inches deep. This was an error. The dimensions of the width and depth should be reversed, reading 11½ inches wide and 10½ inches deep respectively.

Mr. J. H. Gregory, Instructor in Fruit Packing, in the course of his visits to orchards, has observed that many growers do not make their cases correctly, thereby making it harder to put up the standard packs required on the market. Another grave fault is the bad milling of some of the boxes, causing the sacrifice of the essential features which make a particular type of box a success. A particular instance of this is the standard box used for citrus fruits and apples. We often find that millers cut thick tops and bottoms for this box, thereby precluding any chance of the packer putting a correct bulge on the case without damage to the fruit. In the subjoined notes the correct internal dimensions of each case are given, together with a few remarks on the various features in the making up. Mr. Gregory does not give the length and breadth of boards, as these vary with the thickness of the ends of the case and the particular type of timber from which the case is milled.

Australian Dump Case.

(18 inches long by 8⅜ inches wide by 14¼ inches deep.)

Thickness of ends: Minimum, ⅜ inch.
Thickness of sides: Minimum, $\frac{5}{16}$ inch.
Thickness of lid and bottom: ¼ inch.

Use 1¼ inch nails for sides, 1½ inch for tops and bottoms.

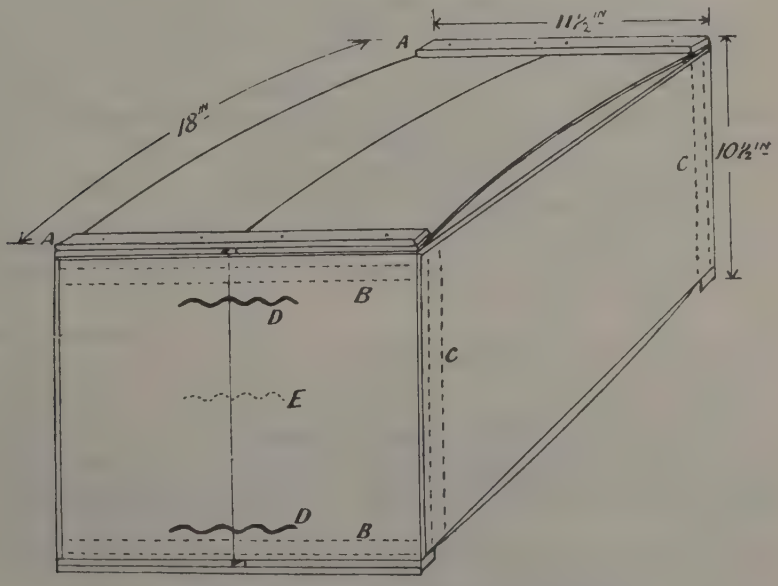

Plate 82.—Sketch of Canadian Standard Case.

Long Bushel Case.

(26 inches long by 6 inches wide by 14¼ inches deep clear of the partition.)

Thickness of ends and partition: Minimum, $\frac{13}{16}$ inch.
Thickness of sides, tops, and bottoms: Maximum, $\frac{5}{16}$ inch.

This case consists of two compartments, each 13 inches long by 6 inches wide by 14¼ inches deep.

CANADIAN STANDARD CASE.

(18 inches long by 11½ inches wide by 10½ inches deep.)

Thickness of ends: Minimum, ¾ inch.
Thickness of sides: Minimum, $\frac{5}{16}$ inch.
Thickness of tops and bottoms: $\frac{3}{16}$ inch.
Dimensions of cleats: 11½ inches long by ¾ inches wide by $\frac{3}{16}$ inch minimum thickness.

This case is made up with thin tops and bottoms to permit of a bulge of 1 inch to 1½ inches in height to be placed on the top and bottom of the case; the thin timber permits this bulge without damage to the fruit. The cleats are used to be placed across the ends of the lids and bottoms to strengthen the thin boards and assist in the prevention of splitting. The thick sides are necessary, as all cases are stacked on their sides when in transit.

Use 1¼ inch nails for sides and 1½ inch nails for tops and bottoms.

The cleats (A) are placed across the ends of the pieces of timber used for the tops and bottoms of the case, and are not used in the position indicated by the dotted lines (B and C). If growers are supplied with a case with two-piece ends, it is suggested that corrugated fasteners (D and E) be used instead of the cleats (B) indicated. Two fasteners (D) to join the two pieces should be placed on one side of the end about 1 inch from either edge (D) and one fastener (E) in the middle on the opposite side of the end.

TROPICAL FRUIT CASE.

(24¾ inches long by 12 inches wide by 12 inches deep.)

Ends: Minimum thickness, 1 inch.
Sides, tops, and bottoms: Minimum thickness, $\frac{5}{16}$ inch.

Use nails of minimum length of 1½ inches for making and nailing.

CALIFORNIAN CITRUS BOX.

(24 inches long by 11½ inches wide by 11½ inches deep, with partition.)
Used for Export overseas.

Ends and partition: Minimum thickness, ¾ inch.
Sides and bottoms: Minimum thickness, $\frac{5}{16}$ inch.
Top: ¼ inch thick, with cleats attached as on the standard box.
Cleats: 11½ inches long by ¾ inch wide by $\frac{3}{16}$ inch minimum thickness.

This case is made up of two compartments, 12 inches by 11½ inches by 11½ inches. Use 1½ inch nails for making and nailing.

ARROWROOT BOARD.

The Governor in Council has approved of the issue of an Order in Council under the Primary Producers' Organisation and Marketing Acts, vesting in the Arrowroot Board the ownership of all arrowroot bulbs grown and arrowroot flour manufactured in Queensland.

On 6th April last an Order in Council was issued giving notice of intention to make this Order and providing for a ballot of arrowroot growers and millers on the question.

The result of the voting was as follows:—

	Votes.
For the acquisition of arrowroot bulbs by the Arrowroot Board ..	81
Against	44
For the acquisition of arrowroot flour by the Arrowroot Board	82
Against	45

As the result was favourable, the necessary Order in Council has accordingly been issued.

THE BUFFALO FLY PEST.

MINISTERIAL STATEMENT.

THE Minister for Agriculture and Stock (Mr. F. W. Bulcock), in a recent statement, expressed his astonishment at the criticism levelled at the application of the policy of control adopted in this State to combat the extension of the buffalo fly pest, and deprecated the publication of protests against the methods adopted, which tend to hamper rather than assist the Department in its policy.

Prior to his assumption of office the Minister pointed out that suggestions had been made for the control of the pest—

(1) By the establishment of a buffer area to the south and east of the area then infested, and the removal of all stock therefrom;

(2) The regulation of stock movements from the infested area and the treatment of stock prior to entry into clean country; and

(3) Biological control, involving the introduction of a predatory insect to reduce the pest to a minimum.

The first suggestion was discarded by the late Government as impracticable, but biological research was undertaken by the Commonwealth Government and is in progress, with prospects of success.

In the meantime, however, the adoption of urgent measures for control was necessary, and a decision was arrived at to erect a spraying plant at Kajabbi to treat all cattle from the infested area, which extends in Queensland approximately as far easterly as the Flinders River, and southerly to the junction of the 19th parallel of latitude and the 140th degree of longitude. This spray was completed in May last, and certain preliminary tests made, as a result of which efficient spraying methods were provided for.

Spraying Travelling Stock.

The Minister arranged for the despatch of a veterinary surgeon and an entomologist to Kajabbi, and under their direction stock have been sprayed, and, with the co-operation of the Railway Department, have been despatched by rail from Kajabbi to the Townsville meatworks and markets. No difficulty whatever was experienced in handling these cattle in the spray. On the 17th June 511 head of lightly infested cattle were sprayed successfully and trucked expeditiously, and on the 27th June 411 head were similarly dealt with. The entomologist or veterinary surgeon accompanies the train for some distance to note the effect of the spray, and instructions have been issued to stock inspectors at Julia Creek, Hughenden, and Charters Towers to make further inspections en route. On arrival in Townsville a further inspection is made by an officer who has been despatched to that city for the purpose, and arrangements have been made for the veterinary surgeon at Townsville meatworks to also inspect the stock. The Railway Department co-operates in the thorough cleansing of trucks and the incineration of all excreta, and the trucks are effectively sprayed with a solution of borax to dispose of any fly larvæ.

Risk of Relaxing Restrictions.

Mr. Bulcock referred to the obvious danger attendant on any relaxation of the restrictions, which prohibit the movement of cattle on the hoof past Kajabbi. However, a concession has been granted which is consistent with the policy of effective control, and which will permit of the removal of cattle from Kajabbi which are not intended for the meatworks, but for movement to destinations south of the Great Northern Railway. These cattle may, after spraying, be trucked to Julia Creek or any station east thereof, or to Butru on the Dajarra Railway, when they may be untrucked and continue their journey on the hoof. The period of transit by rail would in these cases be sufficient for purposes of observation, and would preclude the possibility of the conveyance of the fly into these areas.

The Minister has instructed departmental officers detailed for supervision at Kajabbi to keep him in touch with all developments, and stockowners may be assured that no unnecessary hardship will be imposed, other than is consistent with the adoption of control measures considered essential under the circumstances.

Menace to the Dairying Industry.

Mr. Bulcock desired to remind the critics of the present control methods that, although it is the considered opinion of experts that the spread of the fly is governed by the incidence of rainfall and temperature, no concrete or convincing evidence has been adduced that the fly would not thrive in our coastal areas; on the contrary expert opinions have been expressed that conditions in those areas would be favourable for its propagation and extension. In this connection the Minister referred to

a statement made by Dr. R. J. Tillyard, Chief Entomologist of the Commonwealth Government and one of the leading entomological authorities in the Empire, who expressed a fear that if the pest reached the east coast of Queensland it would spread in a southerly direction to the Hunter River, in New South Wales, with disastrous results. The menace to the dairying industry of this State and New South Wales can, under such conditions, be viewed in its correct perspective by all unprejudiced persons who have the interest of that and other allied industries at heart.

In conclusion, the Minister emphasised the necessity for the adoption of a policy of "Safety First," and in applying that policy, by the introduction of the only practical methods at present available, he appealed to all sections of the community to withhold criticism of a parochial nature, and assist with practical sympathy and co-operation in dealing with the pest as a menace to the welfare of the State in general, and the dairying and pastoral industries in particular.

REPLY TO RECENT CRITICISM.

Replying recently to criticism of Departmental activities in the checking of the spread of the buffalo fly pest, the Minister (Mr. F. W. Bulcock) remarked that it was contended that existing regulations are harassing, and that it was suggested that cattle coming from the suspected areas should not have to comply with the same conditions as prescribed for cattle coming from infested areas. If these areas were suspected, it was quite obvious, he said, that it would be exceedingly unwise to treat the stock running on them as being free from the pest.

A reference to changing boundaries was really a tribute to the vigilance of the officers of his Department, who were endeavouring at all times to accommodate regulations to existing circumstances. Exception was taken to the fact that cattle consigned for spraying at Kajabbi were required to be trucked to either Julia Creek or Butru, a distance of 140 miles. The reason why this precaution was taken was also plain. Kajabbi was just south of the suspected area, and bearing in mind the fact that the buffalo fly had crossed to Mornington Island, in the Gulf of Carpentaria, it was reasonable to suppose that it could be carried conisderable distances on the mainland. The fact must not be lost sight of that the buffalo fly deposits its eggs in the excreta of cattle, and if stock were permitted to walk away from Kajabbi after treatment the whole effect of spraying and the attempt to preserve clean country would be defeated, because unquestionably it would afford successive stages to the buffalo fly on its progress east.

Mention was made of the stationing, only one stock inspector being at Normanton. This was true, but if any alleviation could be afforded by the transfer of another inspector to the district he was quite prepared to send another man along.

The assertion that the danger of the spread of the buffalo fly was over-estimated was not supported by fact. That the fly had been prevalent in the same country for many years was quite correct, but it was only fair to point out the additional fact that the buffalo fly was known in certain areas for fifty years, and never seemed to extend beyond those areas, and then magically it extended east and rapidly enveloped huge areas of cattle country.

In order to make the spraying plant at Kajabbi more efficient, Mr. Bulcock recently authorised the expenditure of a considerable sum of money. He has instructed Veterinary Surgeon Ohman, who is at present at Kajabbi, to make an extensive survey of the whole buffalo fly position in the Gulf country, so that Departmental policy for next year could be framed on the basis of inflicting the least possible hardship on those who are unfortunate enough to be running cattle in suspected or fly-infested districts.

It was entirely wrong, Mr. Bulcock continued, to say that stockowners in the infested country are required to bear the full cost of treatment. As a matter of fact, the only cost borne by the producer is the cost of spraying, which has been reduced to 6d. a head. The organisation has to be maintained both in infested and in clean country, and men are employed at contact points in order to prevent the spreading of the fly east. The general body of stockowners, therefore, were making a liberal contribution towards their own security and freedom from buffalo fly. It was obvious that the buffalo fly should be prevented from spreading further east. It was also clear that once the fly established itself on our coastal country that the dairying industry would be faced with the prospect of enormous losses both of stock and production, and as it was one of the premier industries of the State it was plain that it must be preserved to the State.

The provision of additional spraying facilities at another point would possibly give further relief, and that would be considered when planning next year's control programme.

GRAIN FEEDING OF SHEEP.

NOTES ON NEW ZEALAND TRIALS.*

IN connection with this work, five different mobs of lambs and two mobs of old ewes were fed on wheat and grass, and three other mobs of lambs were fed—one each on rape, peas, and barley. The number of mobs used is not enough to arrive at any conclusion about grain feeding, nor are the trials extended over a sufficiently long period of the year for this purpose. There are good reasons for supposing that, from the point of view of getting good returns from fattening sheep, the best time of the year would be from the end of December till the middle of March, while the weather is warm and the grass capable of growing fast and abundantly in normal seasons. From the point of view of keeping sheep in health (breeding ewes), grain should give results in winter and early spring, when there is not enough grass and when something better than chaff and hard feed is necessary to bring ewes, in lamb or with lambs, along in good condition. There are, however, many possibilities that should be investigated.

LAMBS.

First Trial (100 Lambs).

These lambs began to feed on 30th January on fair grass. Sixty-five went away fat on 24th February and thirty-two on 18th March; two died and three are left that will not fatten this year. They ate 21 bushels of wheat and gave a total live weight increase of 977 lb. Forty-three per cent. of this is carcass, equal to 440 lb., and this, at 8d. per lb., is worth 3,520 pence. The total feeding time was equal to 31 days for all the lambs, or 450 lamb weeks. Charging up the grazing at 2d. per head, wheat returned 10s. 4d. per bushel; or, at 3d. per head per week, 9s. 4d. per bushel. The lambs ate .40 lb. per head per day of wheat and put on .31 lb. per head live weight.

Neglecting the live weight increase and basing our calculations on the sales of lambs only, 100 lambs fed on wheat returned 248s. more than 100 other of the same original mob that were not fed on wheat on this farm. This amount of money can be credited to the 21 bushels of wheat used, and makes the return for wheat 11s. 10d. per bushel—a close approximation to the returns otherwise calculated.

Second Trial.

On this farm three lots of lambs were fed as follows:—

Mob A.—Fifty-two light lambs, bought stores, started feeding 3rd February; finished 16th April. Increase in live weight, 14.8 lb. per head, equal to .21 lb. per lamb per day. Nineteen of them sold as fats. Nineteen bushels of wheat were eaten, equal to about 17 lb. per lamb, or about .25 lb. per head per day. The value of live weight increase equals 43 per cent. of 790 lb. at 8d. per lb.—i.e., 2,720 pence. The value of 528 lamb weeks of grazing, at 2d. per week, is 1,056 pence, leaving 1,664 pence for 19 bushels of wheat, or 7s. 3d. per bushel; at 3d. per head per week for the grazing, the wheat returned 4s. 7d. per bushel.

Mob B.—Seventy light lambs from the same mob grazed for 37 days, from 10th March, and put on 10 lb. live weight. Sixteen were sold fat on 13th April. They ate ¾ lb. wheat per day, and by the same calculations as before, these lambs returned 13s. 8d. per bushel for wheat when grazing is worth 2d. per head per week, and 11s. 11d. when grazing is worth 3d. per head per week.

Mob C.—Forty heavy lambs from the same mob as the above were grazed for 63 days, from 11th March. They put on 7.6 lb. in the time, and 27 of them went away fat by 13th April. They ate the same quantity of wheat per head as the first mob, and, by the same calculation, gave a return of 2s. 11d. per bushel when grazing is 2d. per head per week, and no return at all when grazing is 3d. per head per week.

Third Trial.

Four mobs of lambs at Lincoln College (one on wheat):—

Mob A (Wheat).—Thirty-one fair store lambs were fed from 18th February for seven weeks, and put on 10¾ lb. of live weight in that time. They ate 11 bushels of wheat at the rate of .45 lb. per head per day. When grazing is worth 2d. per head per week, wheat returns 5s. 6d. per bushel; at 3d. per head per week for grazing, 4s. 1d. per bushel.

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*From the final report on trials carried out by the Department of Animal Nutrition, Canterbury (N.Z.) Agricultural College, in conjunction with New Zealand Wheatgrowers' Co-operative Association, Limited.

Mob B (*Peas*).—Thirty-one lambs from the same mob, fed over the same period on peas, put on 10½ lb. They ate 0.71 lb. peas per head per day, and returned 3s. 8d. per bushel when grazing is worth 2d. per head per week, or 2s. 7d. when grazing is worth 3d. per head per week.

Mob C (*Barley*).—Thirty-one lambs, as above, fed over the same period on barley, put on 9 lb. They ate .41 lb. of barley per head per day, and returned 4s. per bushel when grazing is worth 2d. per head, and 2s. 8d. per bushel when grazing is worth 3d. per head.

Mob D (*Rape*).—Thirty-five lambs, as above, fed over the same period on rape, put on 9¾ lb. and ate 2 acres of an average rape crop. This mob provides an interesting side line on the quality of lamb used in this experiment, and the general futility of trying to fatten at a profit store lambs that have been allowed to go back. These lambs, although on good rape during good fattening weather, grew at the rate of only .20 lb. per head per day, whereas lambs that are profitably fattened usually put on about .40 lb. per day. Although the rate of growth is low, and the returns obtained are poor on both rape and grass with grain, the lambs have, in general, done better on grass and grain than they have on rape. In view of the dominant position of rape as a fattening crop, it is of very great importance to find that here is a type of feeding—grain and grass—that has produced unmistakably better results than rape.

Summary of Result Obtained with Lambs.

Number of Lambs.	Amount eaten per day, lb. per head.	Rate of gain per head per day, lbs.	Return per Bushel after Paying for Grass at:	
			2d. per head per week.	3d. per head per week.
			s. d.	s. d.
100	·40	·31	10 4	9 4
52	·25	·21	7 3	4 7
70	·25	·28	13 8	11 1
40	·25	·12	2 11	..
31	·45	·21	5 6	2 1
Peas—				
31	·70	·21	3 8	2 7
Barley—				
31	·40	·18	4 0	2 8
Rape—				
31	..	·20	..	..

So far we have taken the attitude that grain feeding is possible only when the returns obtained more than pay for the cost of feed used. In the writer's opinion there is no doubt that payable returns would be obtained always when grain is used with good lambs and good grass. From these trials, which confirm a very general opinion, it would appear that there is little profit to be obtained from feeding stock that has been abused, no matter what kind of feed is used. This class of stock has to be fed and fattened, however, and in the season just past it could be fed more cheaply with grain and grass than with rape.

In the above feeding trials the amounts of grain eaten per lamb were 20 lb., 18 lb., 10 lb., 16 lb., 20 lb., 32 lb. peas, 16 lb. barley, and it will be seen that, except for peas no feeding cost more than 2s. per head, even when wheat costs 6s. per bushel. Feeding costs never amount to more than 3½d. per head per week, and this, along with the grass charge of 2d. per head per week, is less than the price paid for rape.

OLD EWES.

Old ewes should prove quite a good market for wheat, and in order to get some information on the subject, three trials were carried out, two with wheat and one without.

Mob A (Without Wheat).

Forty old ewes on pea and wheat stubble gave an average increase in live weight of 8.4 lb. per head in the first 27 days and lost 0.2 lb. per head in the last 22 days. On these figures, the returns in live weight from grass only are such that grazing was worth 2d. per head per week.

Mob B (With Wheat and Grass).

Eighty old ewes from the same mob gave an average live weight increase of 9.2 lb. in the first 27 days and 1.8 lb. in the last three weeks, a total of 11 lb. in seven weeks. They ate 39 bushels of wheat, and when grazing is worth 2d. per head per week, the return per bushel of wheat is 13 pence.

Mob C (With Wheat and Grass).

Seventy old ewes gave an average live weight increase of 11.6 lb. in 42 days. They ate 33 bushels of wheat, and with grazing at 2d. per head per week, the return for wheat used is 16½ pence per bushel.

On these returns it has not been profitable to feed wheat to these old ewes, but in all probability this trial was left till too late, when there was not enough grass. The low value per pound (3½d.) is a serious handicap as far as getting good returns from grain is concerned. The disposal of old ewes is, however, a many sided question, and early sales, made possible by feeding grain before the lambs are weaned, may have values that are not readily shown in cash. More information is wanted on the question.

WHEAT BREEDING INVESTIGATION.

ARRANGEMENTS have been made by the Minister for Agriculture, Mr. Frank Bulcock, for Mr. Richard E. Soutter, Departmental Wheat Breeder and Manager of the State Farm at Bungeworgorai to make an extended tour of the chief wheat-growing regions of Australia, in the course of which he will visit Canberra and all of the mainland States. The tour is planned to afford Mr. Soutter an opportunity of conferring with other wheat breeders and observing the results of scientific wheat breeding as carried out at the principal research stations and experimental farms in the Commonwealth.

Mr. Soutter's Career.

Mr. Soutter, who is a Yorkshireman by birth, came to Queensland in early boyhood and has been associated with land interests all his working life. His father, Mr. William Soutter, who has achieved great distinction as a horticulturist, was the first to raise seedling pineapples and sugar-cane in Queensland. Specialising in horticulture, Mr. Soutter, junior, was for four years instructor in propagation at the Queensland Acclimatisation Society's gardens, near Brisbane. He was subsequently appointed to the staff of the Queensland Agricultural College at Gatton. Some time later he was transferred to the State farm at Westbrook, where he took charge of the orchard and vineyard. From Westbrook Mr. Soutter went to Roma, where he established Departmental plant-breeding plots, and when the State farm at Bungeworgorai was formed he was appointed manager, a position he has held for the past twenty-six years. All that time he has been engaged in wheat-breeding work, the results of which have proved of inestimable value to the Queensland wheatgrowers.

Mr. Soutter has made valuable contributions towards the solution of the problem of rust infestation, which renders many of the wheats popularly grown in other States unsuitable for Queensland conditions. Many of the varieties bred by Mr. Soutter have proved definitely rust escaping, and have produced good yields of grain in seasons when the yield of other varieties has been adversely affected by the prevalence of rust.

The proportion of Queensland-bred wheats grown in this State is increasing largely as a result of his efforts and the efforts of those associated with him in this very important work. Among the most prominent kinds evolved in Queensland are Amby, Bunge No. 1, Beewar, Cedric, Duke of York, Flora, Novo, Three Seas, Warchief, Soutter's Early, and Watchman; with the exception of the two first named these were evolved by Mr. Soutter at Bungeworgorai.

Queensland offers advantages for considerable expansion of its wheat-growing industry. Suitable land is comparatively cheap here, and the average yield per acre over the past ten-year period is higher than for any other State of the Commonwealth, with the exception of Tasmania. Those facts have influenced Mr. Bulcock to a large extent in shaping future agricultural policy, and much benefit to wheatgrowers, and to the State generally, should accrue from the results of Mr. Soutter's important mission.

Answers to Correspondents.

Broad-Leaved Fuchsia.

H.H.C. (Dajarra)—

The specimen is Broad-leaved Fuchsia (*Eremophila maculata*). This plant is poisonous to stock, as it contains a prussic acid yielding glucoside. In spite of this fact paddock stock at times seem to eat large quantities of the plant without any ill effects following. Travelling stock, however, or stock coming on to it on an empty stomach, very often succumb quickly, and large losses have occurred in this way.

Groundsel.

F.T. (Ross Creek, via Gympie)—

The specimen is the Groundsel Bush (*Baccharis halimifolia*), a native of South America that has now overrun much country in coastal Queensland. It seems to prefer salt water flats, bordering creeks and rivers, but is by no means confined to such situations, and of late years has spread extensively into a good deal of scrub country. With a strong-growing plant such as this we rather doubt the efficacy of ordinary weed sprays, and grubbing out, though expensive, seems to be the only satisfactory means of eradication. If you wanted to try a spray that is non-poisonous to stock, you could use "Weedex," entaining calcium chlorate at, say, about a 5 per cent. solution. This substance may be obtained from A.C.F. and Shirleys Limited at a price of 12s. 6d. for 42 lb. Though stock have been grazed without ill effects in paddocks where weeds have been sprayed with "Weedex," they should not be allowed to gain access to tins containing the concentrate or unused spray.

Poisonous Plant *(Cestrum Parqui).*

E.J.P. (Brisbane)—

The specimen is *Cestrum Parqui*, a native of South America, now quite common as a naturalised weed about Brisbane. The plant is poisonous, and several cases of stock poisoning by it in the neighbourhood of Brisbane are on record. We have not heard a common name applied to it.

Sorghum fulvum.

Inquirer (Brisbane)—

The specimen is *Sorghum fulvum*, a large coarse native grass, forming a fair quantity of feed for cattle. It is very common in North Queensland, but we have not heard a common name applied to it.

Tick Trefoil and Clover.

W.H.C. (East Malanda)—The specimens were as follows:—

1. *Desmodium triflorum*, a species of Tick Trefoil. This is a small legume widely spread over the tropical regions of the world, and of late years has very much increased in Queensland pastures. There is no doubt that it is a valuable leguminous fodder, but it grows rather close to the ground to provide much feed for stock.

2. As far as we can say from leaves only this is ordinary White Dutch Clover (*Trifolium repens*). We cannot give any reason for the non-flowering of this plant except that your locality may be too hot. It is very difficult to tell clovers in the absence of flower heads, but we have compared your specimen with all the common clovers cultivated here, and it seems to agree best with the White Dutch, as stated.

Poisonous Plants.

L.A.B. (Bauple)—The specimens have been determined as follows:—

1. *Trema aspera*, the Peach Leaf Poison Bush or Poison Peach. This plant has a bad reputation as a poisonous plant in different parts of Queensland and New South Wales. At times it develops a prussic acid yielding glucoside,

but the formation of this is rather erratic. We have seen cattle eat the plant in very large quantities on many occasions without ill effects following, and rather doubt whether it deserves the extremely poisonous reputation given it by many people.

2. *Solanum torvum*, very common in parts of the Wide Bay and Burnett districts, and generally known as Devil's Fig. It belongs to a dangerous family, and the green berries may cause trouble if eaten by stock. Birds, however, apparently eat them with impunity.

3. *Solanum Seaforthianum*, generally known in Queensland as Deadly Nightshade. It is a tropical American plant, now a naturalised weed in many parts of Queensland, especially in parts of the Wide Bay district, where it has overrun much of the fallen scrub land. The plant is definitely poisonous to stock, and if plant poisoning is the cause of your trouble we are inclined to suspect this one. Children have been made violently ill from eating the berries, but birds are apparently unaffected by them, because the plant is spread by them from one locality to another.

Rubber Vine.

"Inquirer," Capella.—

The specimen is as you suspect the Rubber Vine, *Cryptostegia grandiflora*. The properties of the plant are not known, but it belongs to a dangerous family —the *Asclepiadaceæ*—and we should think that if any part of the plant were chewed by children it would make them very ill. The plant has proved itself a pest in some parts of North Queensland, having strayed from garden culture along river flats, &c., where it makes a bad tangle—very difficult if not impossible to ride through.

General Notes.

Queensland Maize Pool.

Executive approval has been given to the issue of a notice of intention to make an Order in Council under the Primary Producers' Organisation and Marketing Acts, constituting a Queensland Maize Board.

Maize growers who at any time after 1st March, 1931, harvested for sale maize (grain) grown in Queensland (except on the Atherton Tableland) or who have growing at the present time maize intended for sale, may petition for a poll to decide whether the Pool shall be created. Such petition must be signed by at least fifty growers as above, and must be lodged at the Department of Agriculture and Stock before 5 p.m. on 8th August, 1932.

The proposed Order in Council will declare all maize produced for sale and harvested in any part of Queensland other than the Petty Sessions Districts of Atherton, Herberton, and Chillagoe, and also all maize of previous seasons produced for sale and which at the date of the Order in Council is the property of and in possession of the grower, to be a commodity under the abovementioned Acts for a period of three years from 1st March, 1932.

There will be constituted a Maize Board consisting of six elected representatives and the Director of Marketing. Two members each shall be elected to represent Districts No. 1 (Moreton), No. 2 (Darling Downs and Maranoa), and No. 3 (comprising the whole of Queensland except Districts Nos. 1 and 2 and the Petty Sessions Districts of Atherton, Herberton, and Chillagoe). These members shall hold office throughout the term of the Board—that is, until 28th February, 1935.

The persons who will be entitled to vote at any election or referendum will be—

(*a*) For the purpose of any poll taken before the Order in Council is made, and for the purpose of the first election of the elected representatives of the Board, all persons who at any time after 1st March, 1931, harvested for sale maize grown in any part of the State except the Petty Sessions Districts of Atherton, Herberton, and Chillagoe; or all persons who, on the date of voting, had growing in that part of Queensland excepting the Tableland maize intended for sale.

(*b*) For the purpose of any poll taken after the Order in Council is made, and for any subsequent election, all persons who at any time during the twelve months preceding the date of such poll or election harvested maize produced for sale within any part of the State except the Tableland and delivered their product to the Board for sale.

If the Order in Council is made, all maize which has been harvested shall become the property of the Pool Board, as also shall maize harvested between the date of the Order and the 28th February, 1935.

Staff Changes and Appointments.

Mr. Edmund Sutton, Fletcher, via Stanthorpe, has been appointed an Honorary Ranger under the Animals and Birds Acts and the Native Plants Protection Act.

Mr. J. Macfie has been appointed an Assistant Inspecting Cane Tester for the forthcoming sugar season, with headquarters at Cairns.

Mr. F. R. Dunn, Inspector of Stock, Winton, has been appointed District Inspector of Stock and Brands, Department of Agriculture and Stock, and will be stationed in the Cloncurry district.

Mr. T. W. Dunning, Audley End, Kilcoy, has been appointed an Honorary Ranger under the Animals and Birds Acts.

Acting Sergeant T. M. Brannelly, Babinda, has been appointed also an Inspector under the Slaughtering Act.

Mr. Walter Blakey, of Ingham road, Townsville, has been appointed an Honorary Ranger under the Animals and Birds Acts, for the purposes of the Mount St. John Sanctuary, near Townsville.

Mr. W. E. Black has been appointed a Ranger under the Animals and Birds Acts.

The following have been appointed Cane Testers at the undermentioned sugar-mills for the duration of the crushing season:—P. H. Compton (Farleigh), Miss D. Marles (Fairymead), L. Chadwick (Bingera), T. D. Cullen (Isis), F. C. Jorss (Maryborough), J. Howard (Rocky Point), Miss O. Knight (Gin Gin), L. C. Home (Millaquin), and C. J. Boast (Moreton).

The following have been appointed Assistant Cane Testers at the undermentioned sugar-mills for the duration of the crushing season:—Mrs. M. C. Beatty (Plane Creek), Miss A. S. Mullin (Moreton), Miss E. M. Mullin (Maryborough), Miss A. Murray (Millaquin), Miss F. Payne (Moreton), and Miss S. Wilkinson (Bingera).

Mr. J. W. Inverarity, manager of the Kalamia Sugar Mill, has been appointed Millowners' Representative on the Kalamia Local Sugar Cane Prices Board, vice Mr. R. H. Farrar, deceased.

Mr. E. Irving, manager of the Goondi Sugar Mill, has been appointed Millowners' Representative on the Goondi Local Sugar Cane Prices Board, in the place of Mr. N. S. Beatty, who has resigned.

Canary Seed Production.

The Minister for Agriculture and Stock (Mr. F. W. Bulcock) stated recently that he had investigated the position of the canary seed industry, particularly with regard to Australia's requirements. The experience of growers shows that there are suitable conditions of soil and climate, particularly on the Darling Downs, for the production of this crop. Australia's requirements are around 1,500 tons a year, but because of the adverse season last year the yield fell to about 660 tons, and a quantity had to be imported. Under normal conditions there should be no necessity to import seed, and farmers, particularly those in districts suitable for growing the seed, are asked to do everything possible to supply all the needs of the Commonwealth market.

At present farmers have the benefit of a favourable tariff, but this may not continue unless Queensland growers show that they are prepared to increase production considerably.

Canary seed is one of those crops which can be planted over an extended period, and is less exacting in this regard than other winter growing cereals. Plantings right up to September have, under favourable conditions, resulted in good yields. In the last two years the Canary Seed Board has been able to return to growers about £26 a ton, net, for cleaned seed, and at this figure it should be an attractive crop to farmers who are suitably situated.

"I am in possession of first hand knowledge," continued Mr. Bulcock, "that merchants handling the seed in the South are somewhat anxious of the position, and are disposed to doubt the ability of the farmers of this State to grow sufficient canary seed to meet Australia's needs. I have given Southern firms an assurance that Queensland growers will satisfactorily meet the market requirements, and it is now for the growers to do their part, and I feel confident that the assurance given will be honoured."

Mr. Edmund Jowett on How to Remove Depression and Unemployment.

At a public meeting held by the Monetary Reform Movement in Melbourne on 5th July, Mr. Edmund Jowett said that he had always been a strong opponent of inflation and of any form of repudiation. But he was also fully alive to the gigantic evils of that policy of deflation which the world had been so diligently and ignorantly following during the last seven years.

That policy of deflation took the form of contracting the currencies and of limiting the purchasing powers of the people of the world in order to bring down the wholesale prices of commodities. So far as he could ascertain it was the work of about thirteen men, whom he would designate as philosophers. They were full of knowledge, and were wizards in finance. They were the high priests of the worship of the gold standard, and of the policy of deflation, which was the world's chief source of depression and unemployment.

Fortunately, however, as against the thirteen deflation philosophers a school of newer economists and statesmen had arisen in England who were now contesting the ground against the deflationists. He had a list of fourteen of them, men of great distinction, all of whom desired, and some of whom demanded, that the prices of the period 1926 to 1929 be restored.

This was a wise and humane attitude. It was expressed by Sir Basil Blackett, a director of the Bank of England, who had said, "The volume of money should be increased or decreased according to the amount needed to keep prices stable."

Mr. Jowett's advice to everyone in Australia was to turn a deaf ear to the followers of the thirteen high priests of deflation and desolation, and to support the doctrines of the fourteen newer economists.

Dairy Herd Improvement.

The Minister for Agriculture and Stock (Mr. F. W. Bulcock) stated recently that the Government had approved of a scheme having as its object the further improvement of the dairy herds of Queensland. In outlining the scheme, Mr. Bulcock said that a remarkable improvement had taken place in the breeding of the better class dairy cow following the introduction of the Dairy Cattle Improvement Subsidy Scheme (commonly known as the Better Bull Scheme) by Mr. Forgan Smith when Minister for Agriculture. This scheme, which was discontinued in 1930, gave a great impetus to the use of approved purebred sires, and was instrumental in bringing prominently before breeders of purebred stock the necessity of production recording.

With the decrease in cream values it is essential that dairy farmers should continue to improve their herds. At present dairying is one of the most important of our primary industries, contributing last year through the export trade approximately £4,000,000 to the credit of the State's trade balance. The foundation for the dairying industry of the future must be laid now in the breeding and rearing of high-class dairy stock.

With this object in view the Government has decided to grant a rebate of railway freight on approved purebred dairy sires to a maximum of £10.

It is essential that the dams of such sires shall have attained the standard of production required under the official Australian Purebred Production Recording Scheme. Such sires must be between the ages of one and six years, be registered or eligible for registration in a recognised herd book, and be certified free from disease.

Mr. Bulcock added that this rebate will apply in respect to freight within Queensland only.

Maize Importations.

The Minister for Agriculture and Stock (Mr. F. W. Bulcock) stated recently that it would be remembered that he had communicated with the Minister for Trade and Customs (Mr. J. A. Perkins) some few days ago, in respect to the importation of maize and maize by products from overseas, and had protested against grain being

introduced into Australia until such time as supplies within Australia had been absorbed. He had received a reply, wherein he was advised that the existing import duty on maize, which is 3s. 6d. per cental (general tariff), plus 10 per cent. primage, will be continued. The protection to Australian growers is further assisted by the adverse exchange rate.

Agricultural Correspondence Courses.

After perusing recently the series of correspondence lessons, arranged by the Department of Agriculture and Stock for the benefit of young rural club members, the Minister, Mr. F. W. Bulcock, expressed the opinion that the course is an admirable one.

Though at present in its initial stages and largely experimental, the series of correspondence lessons in pig raising had, he added, been taken up enthusiastically by a number of junior farmers and by lads in course of training at the Salvation Army Farm at Riverview, Queensland. Writing of his opportunities, one of the correspondence course students, Mr. Robert Williams, states that "due in no small measure to the experience gained through this course of lessons, and to the fact that he has a determination to succeed, he has been placed in charge of an important stud of pigs, the property of a well-known business firm in Gympie (Messrs. Drummond and Parke, Limited), and already results are proving satisfactory."

There are, to the instructor's knowledge, said Mr. Bulcock, hundreds of young men in this State who, through lack of finance and opportunity, are unable to benefit by a course at an agricultural college. There are many more living at so great a distance from central training schools that attendance thereat is almost impossible; while there are others, graduates of the Home Projects Scheme, leaving or having left school, who would be prospective students of practical agricultural correspondence courses. The scheme, therefore, has a very fine objective, and in expressing his appreciation the Minister hoped the instructors would continue with the good work.

The officers principally concerned at present are Mr. E. J. Shelton, H.D.A., Senior Instructor in Pig Raising, and Mr. L. A. Downey, H.D.A., his assistant, who acts as examiner of the students' work.

Wheat Board.

Executive approval has been given to an amendment of the State Wheat Pool Election Regulations, which will provide that the five wheatgrowers to be appointed to the Board from 1st September, 1932, shall hold office until the 31st August, 1933, only.

The regulations originally provided that Board members should be appointed for a period of two years, but as the Wheat Pool Acts have been extended to the 1932-1933 season only, the amendment has been found necessary.

Banana Marketing.

An amendment of the Fruit and Vegetable Grading and Packing Regulations, issued in pursuance of the provisions of "*The Fruit and Vegetables Act of* 1927," has received Executive approval to-day. This amendment provides that in the case of all varieties of bananas marketed in the bunch, the number of fruit in dozens (to the nearest half dozen) shall be legibly branded on the bunch stalk near the top end: Provided that in the case of Cavendish bananas the number of fruit in the bottom hand shall not be counted.

Tomato Marketing.

A regulation has been issued under the Fruit Marketing Organisation Acts which provides for a ballot to be taken on the question of the acquisition of tomatoes by the Committee of Direction of Fruit Marketing.

The Committee of Direction has acquired tomatoes for the past three years during the same period as is desired this year—namely, three months from the 15th September to the 15th December, and the system has met with the general approval of growers.

The districts to which the proposed acquisition shall apply may be roughly described as being those within an area bordered on the north by Rockhampton, on the west by Rosewood, and on the south by the New South Wales Border, and including the islands in Moreton Bay.

The ballot will be conducted by the C.O.D., and will close at noon on the 13th August, 1932.

Growers concerned for the purposes of the poll comprise all persons, not being persons engaged in the growing of tomatoes as employees on wages or piecework rates, who have, and who sign a declaration that they have, at the date of the poll, tomatoes growing in certain specified areas for market.

Canegrowers' Council.

The Queensland Cane Growers Council Regulations, issued under the Primary Producers' Organisation and Marketing Acts, have been amended, and additional regulations approved, which prescribe the fees, allowances, and travelling expenses payable to members of the Queensland Cane Growers' Council when they are required to attend any conference or deputation outside the State.

The fees, allowances, and travelling expenses payable to members of the various District Executives and Mill Suppliers' Committees are also provided for. Additionally, a member of a District Executive or Mill Suppliers' Committee attending as a delegate from a sugar-mill the annual sugar industry conference convened by the Queensland Cane Growers' Council, shall receive an allowance whilst sitting at the conference, together with a travelling allowance, and the reimbursement of all railway and other fares which are reasonably necessary and which are actually incurred.

Border Crossing at Goondiwindi.

An Order in Council has been issued under the Diseases in Stock Acts, appointing East Goondiwindi to be a crossing place for stock from the State of New South Wales. East Goondiwindi is situated three and a-half miles from the town of Goondiwindi, and is considered a much more suitable place, in all respects, than the present crossing place, which necessitates stock having to be travelled through the main thoroughfare at Goondiwindi.

Commercial Cane Sugar.

A Regulation under the Sugar Cane Prices Acts has been issued rescinding General Regulation No. 4, which was passed in February, 1916, regarding the methods of determination of commercial cane sugar in cane. The new Regulation aims at uniformity in the methods of making analysis by mills for payment purposes.

Since the original Regulation of 1916 was passed, conditions have altered so that the provision of sampling for three minutes is not practicable owing to the higher crushing rate. Again, the term "sucrose" now has a different meaning, and is replaced by the international term "Pol." With the added knowledge in the possession of the Central Sugar Cane Prices Board, it is considered advisable to lay down definite methods for determining the factors used in the calculation of commercial cane sugar, and particularly with regard to "fibre in cane," the method is set down in detail.

Provision is made in the Regulation for the accuracy of the instruments to be used in the determinations. The new Regulation amplifies generally the one which it rescinds.

Beekeeping Regulations.

Regulations to give full effect to the provisions of "*The Apiaries Act of* 1931" have received Executive approval. These Regulations prohibit the entry into Queensland of bees, bee combs, beeswax, second-hand hives, second-hand beekeepers' appliances, or honey, unless they are introduced at stated places of entry, and conform in all respects with the provisions of the Act and Regulations. Provision is made for the quarantining and treatment of diseased bees, and for the registration, in the prescribed form, of apiaries or hives. The fees for registration, or any renewal or transfer thereof, shall be—For an apiary consisting of 1 to 15 hives—2s. 6d.; 16 or more hives—5s.

Certificates of registration are issued and shall remain in force until 31st December of the year following the year of registration, but may be renewed thereafter in the same manner and for a like period as the original registration is made. Inspectors under the Act are given certain powers with regard to the inspection of apiaries, and for prescribing the treatment or destruction of diseased bees.

Silage as Stock Insurance.

A consideration that must weigh heavily in favour of silage is the insurance it offers against the loss of valuable cows during a hard winter or a drought. Dairy herds that have taken years to build up are worth a great deal, and the numbers

and the standard of a herd cannot be easily recovered when a drought ends. If losses occur periodically, the rate of improvement in the herd is very slow indeed, as the ground lost during one drought has probably hardly been regained when another period of scarcity comes along. It is the best cows that generally go off first if feed is scarce, as, owing to their high-producing disposition, they keep low in condition; while the poor yielders keep themselves in condition by using the feed to build up flesh and strength instead of making milk.

Points in Calf-Rearing.

In the rearing of calves it is important that they be fed separately. The practice of feeding in tubs or troughs must be strongly condemned, because it allows the fast drinkers to get too much milk at the expense of the slower ones. It also tends to make young animals drink faster than they should, which gives rise to digestive troubles. Slow drinking should be encouraged, because it allows the milk to combine in proper proportions with the saliva and assures thorough digestion. Proof of this is shown by the fact that slow drinkers always grow best, provided, of course, that they are given their full ration of milk. Moreover, it is impossible to cleanse a trough thoroughly, and as a consequence it is a common cause of scours —more particularly when made of wood or a hollow log.

Money is well spent in the erection of proper yards and bails for calf feeding, much time and temper being saved thereby. Too often there is an entire lack of convenience for this important work, which is carried out twice every day.—A. and P. Notes, N.S.W. Dept. Agric.

Australian Nuts.

The Minister for Agriculture and Stock (Hon. F. W. Bulcock) in a recent Press interview stated that he had received a report from Mr. H. Barnes, Instructor in Fruit Culture, who had represented the Department at the recent conference of nut growers at Murwillumbah.

He was very pleased indeed, stated Mr. Bulcock, to note that the meeting had been such a success and that representatives of various phases of the industry had interested themselves sufficiently to be present, in some cases having journed long distances.

Now that the movement has been started in the right direction it appears very evident that much benefit will result to nut growers, and it behoves them all to become members of the new Nut Growers' Association which has been formed.

The conference was of special interest to growers and prospective growers of the Queensland nut (or the Australian nut, as the conference has decided it should be called, since the term "Australian nut" had a national significance and would be a good advertising medium overseas).

This nut was one of the finest grown anywhere in the world, and we were fortunate in that it was indigenous to the coastal districts of the southern parts of this State and to the northern districts of New South Wales. It was a hardy tree, and according to experiences related by growers at the conference could be grown and would thrive in quite a variety of soils.

The market prospects appear to be good. One exporter had received a report from principals in America that they could find a ready market for from 50 to 100 tons per month if they could get the nuts at a reasonable figure.

Regarding the right varieties to plant there appears to be much to be said for both the thin shell and medium shell nut. The actual value of the crop was, of course, based on the proportion by weight of kernel and shell, so that it could be taken for granted that big kernels were a desirable feature. The actual thickness of the shell within reasonable limits would, it was hoped, in the future present no serious difficulties as quite a number of inventions were being made and tried out, both for hand-cracking and cracking by means of rollers.

The industry was, of course, as yet in its early stages and much had yet to be done to place it on a sound footing.

It had been a matter of some difference of opinion at the conference as to whether the Australian nut grow true to type from seed, but apparently it did not. Experiments would have to be carried out to ascertain the most successful method

of grafting and vegetative reproduction, and in this connection it was hoped shortly to establish an experimental farm where different varieties would also be tested out.

It is proposed to hold a second meeting of the Association in Brisbane on the Thursday of Exhibition week.

Halo Blight of Beans.

The Minister for Agriculture and Stock (Mr. F. W. Bulcock) has made available the following advice to prospective bean growers:—

Halo blight, a bacterial disease of beans, was responsible for considerable losses last season. Already numerous complaints have been received by the Department of Agriculture and Stock during the past few weeks of bean crops in various districts being affected with this trouble. Hence it is anticipated that the disease will be just as prevalent this year as it has been in the past.

Halo blight affects the stems, leaves and pods, and under favourable conditions may result in the complete destruction of a crop. Seed from diseased plants may carry the causal bacterium or germ both internally and on the surface. When such infected seed is grown the resulting plants are diseased. So far it has not been found possible to destroy the organism in the seed without also destroying the seed itself. Hence the only practical method of avoiding the disease depends on planting only seed which has been derived from a disease free crop. Even if it were economical to spray bean plants with a fungicide it would be ineffective on plants which are already diseased, as is the case with those derived from contaminated seed.

It would appear from the number of outbreaks occurring that a large proportion of the seed being used at present is carrying the causal organism of this disease; consequently growers are advised to make sure that any seed purchased has been obtained from healthy crops only. If such a guarantee cannot be obtained it would be wiser not to plant beans at all until a satisfactory supply is available. Certain lines of seed from Norfolk Island are probably amongst those most likely to be free from the disease at the present time.

Should clean seed be available it would be advisable to plant a special plot for next season's seed supply, as well as making the usual planting. This seed plot should be carefully examined during the growing period and any plants showing symptoms of the disease should be removed and destroyed as soon as observed. At the end of the season seed should be saved only from unblemished pods on perfectly healthy plants.

Poisoning of Mice—An Effective Mixture.

Mr. S. Wilson, of Lake Cowal Station, Marsden, has notified the New South Wales Department of Agriculture that very effective results had been obtained by using a mixture for poisoning mice. This was made by boiling in a 5-gallon drum 1 lb. of commercial arsenic in 4 gallons of soft water, no washing soda being required. The drum should be hung up, so that the mixture boils from the bottom, otherwise the arsenic will not be completely dissolved. After boiling for about twenty minutes, sufficient water should be added to bring the quantity up to 4 gallons again.

For use, a gallon of the mixture should be diluted in 20 gallons of water. In summer, mice drink this readily. Stakes in pairs should be driven in the cave of the haystack in several places. A tin meat dish should be tied by the handles to the stakes, to prevent strong winds upsetting it. Two or more flat pieces of board about 2 inches wide should be used as ramps for the mice to drink from.

Mr. Wilson stated that mice poisoned in this way will not damage the hay for feeding to horses.

Peanut Board.

The following Peanut Board nominations have been received:—

District No. 1 (Wienholt and Nanango)—
Norman James Christensen, Wooroolin.
Frederick Christian Petersen, Kingaroy.

District No. 3 (Rest of Queensland other than Central Queensland)—
Albert George Whiting, Atherton.

The date fixed for the return of the ballot-papers to the Department is on or before the 24th August next. Mr. Petersen is the present member for District No. 1.

Rural Topics.

Know How to Rear Pigs.

Messrs. Pope Brothers, whose property at Nambour, Queensland, is divided into three dairies, make pig raising a very profitable sideline in their business. Pinning their faith for many years to the Middle White breed, they have done remarkably well, and find a ready demand for stud pigs and weaners. Through careful selection Pope Brothers have built up a herd of sows for prolificacy and rearing capacity considered to be well above the average. Home-bred sows are kept, and every few years a boar is imported from another stud—at present a New South Wales bred sire is doing service.

Figures recently supplied from one of the Pope Brothers' farms, where four Middle White sows are kept, show what can be done when selected breeding stock are kept and given reasonably good conditions:—

Mid. White Sow.	Farrowed.	Pigs Born.	Pigs Reared.
1. Rose	27–8–31	10	10
2. Bud	29–8–31	9	9
3. Crystal	12–12–31	9	9
4. Pearl	13–12–31	8	8
5. Rose	23–3–32	13	10
6. Bud	4–3–32	8	8
7. Crystal	14–6–32	10	10
Totals		67	64
Average		9·5	9·1

Note regarding Litter No. 3.—Sow's first litter.

Note regarding Litter No. 4.—Sow's first litter.

Note regarding Litter No. 5.—Sow suffered from fever after farrowing, and the ten pigs were hand-reared, as the sow's milk flow ceased a few days after farrowing.

Note regarding Pearl.—Pearl was a few days off farrowing again when these figures were taken on the 5th July, 1932.

Value of Trees on the Farm.

Though their claims are so generally neglected, trees serve many important purposes on farming and pastoral areas. They may be usefully employed in the following ways:—

As windbreaks and shelter belts. As isolated or scattered shade and shelter trees. As a reserve supply of fodder for periods of drought. As tree plantations to supply the timber and fuel requirements of the farm, in addition to providing a source of revenue by the sale of products. As screens around dams and tanks to prevent silting up by dust and undue evaporation of the water contents. As a means of preventing erosion on slopes and along the banks of creeks and rivers. As a means of enriching worn-out or poor land. As ornamental trees in improving the appearance of the homestead. As bee trees.

Generally speaking, May to August are the best months for tree planting.

Virtue of Green Feed.

The value of green feed is frequently emphasised in recommendations on stock feeding, its virtues being latterly largely attributed to its vitamine content. Recent research shows, however, that the actual chlorophyl (green colouring matter) is of significance in the process of nutrition.

The fact is of particular interest in relation to the control of osteomalacia (bone-chewing) in cattle, points out the Chief Veterinary Surgeon of the New South Wales Department of Agriculture in drawing attention to the discovery in an article in the current "Agricultural Gazette." In an article in that journal some nine years ago, observes the writer, attention was drawn to the value of the supply of bonemeal for many of the cattle running on the poorer coastal country and the equally high value of the supply of small quantities of actually growing green feed.

It was pointed out that, much of the country being calcium-deficient and the drain of calcium from a milking cow being heavy, it was necessary to do everything possible to enable the animal to utilise calcium present in the food. Actual experience in the field has shown the benefit of providing in late winter and early spring months a small quantity of growing green feed for cows. Based on the knowledge available at that time, the suggestion was made that this was probably due in part at least to the vitamine content of such green food.

Recent work published in German journals provides a further explanation. It appears that chloropyl has, according to the authors under consideration, a definite action in assisting animals to utilise the calcium in their feed. On the other hand, chlorophyl which has been changed by the influence of drought, heat, or acid fermentation, prevents this utilisation. When calcium is not properly utilised osteomalacia is likely to occur. There is indicated, therefore, in this work an additional reason for providing some growing green crop for the cattle during the months when the ordinary pastures are at their worst.

The Pig Industry—Export Possibilities.

In an interesting and informative report on the Australian pig industry, recently published by the Council for Scientific and Industrial Research, it is pointed out that, with the co-operation of Mr. R. B. Kelley, B.V.Sc., an officer of that body who has recently returned to Australia from a visit to the United States and Great Britain, a considerable amount of valuable data has been collected for the information of farmers interested in this branch of agriculture.

It was in May, 1931, that the Council, through its Queensland State Committee, received a request from the Queensland Pig Industry Committee that various problems relating to pig production in Queensland be investigated, one of the principal problems being that of infant mortality in pigs, a trouble the committee believed to be largely of a nutritional nature, and therefore amenable to control.

Mr. Kelley happened at that time to be in the United States investigating various other matters, hence he was instructed to give attention to the pig industry, and his report (now submitted) contains his view on various aspects of this important industry. Mr. Kelley points out that the countries most prominent in the international trade in these products—the United States of America, Denmark, Netherlands, Canada, and Germany—are differently situated to Australia in that the first three are mainly producers, while the latter two—Canada and Germany—are mostly consumers. He emphasises that England has a greater importation of pig products than any country in the world, and it is the English demand for bacon carcasses in which he finds the greatest prospect for Australian producers.

His contribution to the literature available on this industry is very welcome indeed, especially as it comes at a time when consideration is being given right throughout Australia to organisation of the pig industry on lines that would encourage the building up of suitable overseas outlets both for frozen pork and bacon carcasses shipped in a frozen state for conversion into bacon at port of discharge in Great Britain.

The feeding of pigs for export is discussed at some length, largely from points of view of the nutritive ratios of food materials readily available in Australia and of balancing the diets.

Abnormalities and pathological conditions affecting costs are discussed in connection with small litters and deaths at birth, deaths soon after birth, sanitation, the McLean county system for parasitic control, paralysis, seedy belly, soft pork, and yellow fat.

The report presents a very useful survey of the position, as it is both in Great Britain and America where the nutrition and diseases of pigs have been extensively investigated, for in Europe and America, as well as in Great Britain, the pig industry is a very important one. Important questions dealt with in addition to those referred to above include the populations and consumptions of pigs in various countries, the requirements of the English market and how they are being met, the possibility of an export trade from Australia, standardisation of suitable export types, the production of the export type, and general conclusions.

Tractor Operation—Fuel an Important Factor.

To obtain the best possible operation from a tractor it is desirable that the owner should carefully study everything connected with it, so that the troubles that have beset many a tractor may as far as possible be avoided. One decision a tractor owner must make is in choosing a suitable fuel, which must always have a very important bearing on the operation which may be expected from the machine.

An essential requirement in a power kerosene for use in tractors is high volatility, which means "readiness to vaporise." Kerosenes that will not vaporise readily are liable to have several defects.

Efficient combustion cannot be obtained with an unsatisfactory air-fuel mixture, and kerosenes of low volatility will not give a proper mixture. If the fuel is too heavy to readily mix with the air, liquid particles will be carried into the cylinder as part of each charge. These liquid particles are practically incombustible in the normal kerosene engine, and this means that the whole of each charge will not be burned. Maximum power output therefore cannot be obtained, and much fuel is wasted.

Apart from being wasted the vaporised and unburned fuel will do actual harm in its effect on the lubricating oil. Its washing effect on the lubricating film on the cylinder walls and its final deposition in the crankcase oil are dangerous. Crankcase oil dilution has ever been the bugbear of the kerosene engine operator, as it is the root cause of many bills for repairs and replacement of parts. It may seem stretching a point to directly connect the invoice for a new bearing with the invoice for a supply of low grade kerosene, but it has been proved time and again that the fuel used has been directly responsible for repairs needed.

The wise tractor owner therefore uses a highly volatile kerosene, such as Voco power kerosene, from which he can expect, and does get, a complete combustion, which means delivery of full power from every charge and an absolute minimum of oil dilution.

Its capacity for smooth idling and for quick takeup of increased load, as well as its ability to permit switch over quickly and without trouble, are governed by the volatility of a kerosene. Highly volatile kerosenes will do these things easily, whilst fuels of low volatility will smoke, splutter, and stall because they do not readily respond to the varying needs of the engine.

Volatility should be combined with other attributes in the kerosene that will give the best operation of a tractor engine. It is not worth having a fuel of good volatility unless there is also high resistance to knocking in that fuel. High anti-denotating property in a kerosene means that you can work at full load hour after hour, negotiate the tough bits of ground without faltering, all without that knock that tells you power is being lost and engine parts strained. Voco power kerosene is well known for its excellent knock-resisting properties as well as being a thoroughly refined product.

A Point in Pig-feeding.

It is necessary, if the best price is to be obtained, that pigs should be of the correct type, well fed and topped off before being sent to the market, and the growing conditions should be so arranged that they develop and arrive at the desired weight in a specified time. A system of grading should always be in operation on the pig farm, each grade being kept in its own yard or small paddock. Unless such a system is followed the large pigs do not give the smaller ones a chance, the result being that the latter take longer to get into market condition, with consequent loss to the producer.

Control of Fowl House Vermin.

With the approach of warm weather poultry farmers should be on the alert for signs of such parasites as red mite and (in inland districts) fowl tick. For the control of those parasites of poultry which spend portion of their life on the roosts and other parts of the poultry house, in which category are both of those just mentioned, there is nothing more effective than thorough sprayings with kerosene emulsion.

To make the emulsion, take 8 oz. of soft soap and dissolve it in 1 gallon of boiling water; take the mixture off the fire and add slowly 1 gallon of kerosene, stirring all the time. This mixture should be agitated briskly until the oil and the soapy water are thoroughly emulsified. These 2 gallons are then designated the "stock." Add this to 8 gallons of soft water. Hard water will not do, nor should lime or any caustic substance come in contact with it, or the result will be that the oil will separate from the soapy water, and the emulsion will be spoiled.

If it be desired to make the spray also a disinfectant, add one tablespoonful of miscible carbolic acid to each gallon of emulsion. The whole should be kept well stirred, especially when adding water.

A small force-pump suitable for this work, which can be stood in a kerosene tin and held down by means of a foot-rest that is provided, is obtainable at a small cost.

Tractor or Horses—A Farmer's Debate.

Members of the Wolseley Branch of the Agricultural Bureau of South Australia spent an evening recently in discussing the relative merits of tractors and horses for field work. The gist of their arguments, pro and con, is contained in the following extract from the Journal of the Department of Agriculture, South Australia:—

Tractor versus Horses.—Mr. S. J. Baker read the following paper:—"First it is necessary to purchase a good, reliable make of tractor, which will cost approximately £500. The life of the tractor will depend on how it is looked after. If the manufacturer's instructions are followed a tractor should give seven to ten years of general farm work. After having worked the tractor for two years have the engine overhauled once each year. For the soil in this district one requires a tractor that will do at least a 10-horse job, and one that will work twenty four hours a day when necessary. The cost of ten horses, harness, stable, and feed for the first year would cost as much as a tractor and fuel for the first year. Tractor and fuel for the first year, £650. Horses:—Ten at £30 each, £300; harness, £8 per horse, £80; feed, £20 per horse, £200; chaff, shed and stables for ten horses, £100; total, £680. The tractor would be much quicker than the ten horses, and time is worth considering. With tractor farming one would not require to employ so much labour as farming with horses. Ten horses would require approximately 50 acres for grazing per year. With a tractor this 50 acres could be cropped and show a good return. The attention that a tractor in working order requires would not be more than half an hour a day. With horses it is necessary to get up early to feed and groom; this is wasted time. When the ground is suitable for horses to work on it is suitable for a tractor, and, done with a tractor, has a better appearance, and there is not so much waste time. The tractor will not tire from heavy working. When a horse breaks down it must have a spell, and therefore a spare horse or two has to be kept on the farm. With a tractor small mishaps can be fixed up in very short time, and not much knowledge is required. When the day's work is finished a tractor is ready for duty the next morning, and does not want feeding."

Horses versus Tractor.—Mr. S. Snoad read the following paper:—"It is easier to start farming with horses than with a tractor, because of the difficulty of obtaining finance. Whilst horse-power is slow, it is steady, and there is not so much likelihood of breakdowns. There are farmers in this district who owned tractors, yet they work horses, and leave the tractor in the shed. A horse farmer can maintain his team by rearing one or two foals each year, and so keep the team young and active. The life of a tractor is only about five years. To obtain the best results from a tractor the machine should be worked by the same man the whole time. Probably the lack of experience in tractor drivers is one of the greatest obstacles at present in the way of successful power farmers. The person in charge of the engine should realise that a very delicate piece of mechanism has been placed in his hands, and that skill and attention are needed constantly if best results are to be obtained from the tractor. A team driver does not need any mechanical knowledge to manage and drive horses. The work of a team of horses is done silently and without the continual vibration which eventually affects the nerves of the operator of the tractor. A farmer can do the work much cheaper by having a good grass paddock for his horses for working the fallow. I worked 140 acres three times on one feed a day. The horses were got in in the morning from the paddock and worked until dinner time, and then turned out again in the paddock at night. They were in fat condition the whole time."

Horses versus Tractor.—The following paper, putting the claim for horse as being the most efficient and economic worker on the farm was contributed by Mr. E. Sharrad, who proposed to deal with farms of no more than 700 acres:—"This farm cannot be more efficiently worked with a tractor than with horses. In the Tatiara, in a normal year, one has to do a certain amount of fallowing when the crabholes are full of water. The horses will do this job, as well as the hundred and one small jobs on a farm which require a horse. The horse has helped to buy most of the tractors on the farms. I have worked both the tractor and horses, and would rather drive the horses. The latter is a cleaner, warmer, and a quieter job. If one horse is sick it can be replaced at very little cost; one can perhaps borrow from a neighbour who has a few idle horses. If the same trouble persists in a tractor it is impossible to borrow another tractor, and one may possibly be hung up for a week or two in seeding or harvest, waiting for repairs. Most writers, when comparing the relative value of the horse and tractor, put too high a price on the horse. A half-draught horse can be bought for £10 or £15, which will do the work, and do it well. There is no necessity to pay high prices for horses. A young farmer starting on a farm on his own can aim at getting a good team by gradually raising the class of his team

by breeding. Two good mares will breed up a team in a few years, and by always breeding a couple of foals every year it will not be necessary to pay high prices to fill up the gaps in the team, occasioned by old age and the loss of a horse. The cost of keeping a foal is very light until it is ready to break in. After paying for the service of a good sire, there is practically no expense until it is time to break in the foal, and then only at a cost of about £3 10s. for harness, which, if carefully looked after, will last for twenty years. The heavy initial cost of the tractor gives the farmer a good deal of worry wondering if he is going to pay for it. The tractor is a continual drain on the finances of the farmer for grease, benzine, and kerosene all through seeding and harvest. Money is sent out of the Commonwealth for the tractors and all that propels them comes from overseas. The horse and all its harness are products of Australia. It should be the aim of all farmers to build up the Commonwealth by using horses, thereby effecting a saving of money."

Tractor versus Horses.—Mr. A. Grosser read the following paper:—"The tractor has its advantages and disadvantages. If farmers would realise that the power of a tractor is limited to pull a certain load it would give far better results. The life of a tractor depends on the treatment it receives. One does not hear of a farmer going out with an eight-horse team and pulling two ploughs with it; yet this is not uncommon with the tractor. The most important point to watch is the oiling. Also water and grease the cups, and keep all bolts tight. The tractor is able to take the place of an engine for cutting chaff, and can be used to assist in putting in and taking off the crop at a critical stage. Horses have to be given a spell, but the tractor, with proper care, will work continuously. It can also be used for pulling trees and pumping water. The tractor is worthy of a place on the farm. Those in the past who were not in favour of tractors have one to-day."

Horses versus Tractor.—"There is no doubt that the tractor has its good points, but from my experience, horses are the best all-round form of farm power," said Mr. H. W. Orton, in a paper on this subject. "Australia produces its own horse-power, and by using this power we are helping ourselves. The tractor is made overseas, the fuel is imported, and the money goes to other countries. It is argued that the tractor will sow twice as much area as a team of horses. This is possibly true, if everything goes well; but in the case of a breakdown with the tractor it will mean perhaps the loss of a week before the part is replaced. If a horse becomes sick, at a pinch it is possible to carry on with one less, but generally there is a spare horse on the farm that can be used until the sick one recovers. If at fallowing the ground becomes wet and the crabholes boggy, the horses are able to get along, but the tractor bogs and makes a poor job of fallowing. At harvest it does not pay to work the tractor half loaded, and the average-type is not more than half-loaded when pulling a harvesting machine. This is waste of fuel. It requires two men to operate a tractor and stripper; one can drive a team of horses and work a stripper, and there is no danger of fire with horses. When carting wheat horses load the wagon with the bag-lifter, which would be a very tiresome job for the tractor. The feed which the horses eat for the year does not cost the farmer a great deal to produce, but fuel which the tractor uses requires money to procure. Tractor driving is a strain on the nerves, but it is a pleasure to drive a team of good horses."

QUEENSLAND SHOW DATES, 1932.

Royal National: 8th to 13th August.
Crow's Nest: 24th and 25th August.
Wynnum: 26th and 27th August.
Mary Valley, Imbil: 2nd and 3rd September.
Enoggera: 3rd September.
Pomona: 14th and 15th September.
Malanda: 14th and 15th September.
Beenleigh: 16th and 17th September.
Rocklea: 24th September.
Southport: 7th and 8th October.
Nerang: 14th October.

The Home and the Garden.

OUR BABIES.

Under this heading a series of short articles by the Medical and Nursing Staff of the Queensland Baby Clinics, dealing with the welfare and care of babies, has been planned in the hope of maintaining their health, increasing their happiness, and decreasing the number of avoidable cases of infant mortality.

SAVE THE CRIPPLES.

THE recent epidemic of infantile paralysis caused much alarm. The mysterious way in which it spreads, the impossibility of escaping infection, and the crippling paralysis, which it may leave behind, were a natural cause of anxiety to all parents. Now that the epidemic is over, all this may be forgotten. That would be deplorable, for now is the time when we should be giving it the most serious consideration.

Medicine has made some advance recently in the treatment of this disease. Its earliest symptoms before the onset of paralysis have been carefully studied. By the use of human serum the onset of paralysis has been prevented in many cases, but this can be done only when the disease is seen and recognised in the earliest stages. This epidemic has left many cases more or less paralysed. During the two months after the acute stage is over there is a strong tendency to recovery. Some recover completely. More often one or several muscles are left still paralysed; sometimes extensive paralysis remains.

Grave Penalty of Neglect.

What is to be done for the cases that have not completely recovered? Even one paralysed muscle may be a serious disability. The paralysis of many will need the most careful treatment, if the child is not to become a hopeless cripple. Now is the critical time. Neglect now will injure the child's whole future life.

The epidemic prevailed in Sydney before it attacked Brisbane. Of 120 cases in a Sydney hospital twelve died, forty-two were discharged completely recovered, sixty-six had still some damage to the muscles. Of these last about half are expected to recover completely under proper care within six or twelve months. The remainder have sustained permanent damage, and only the most persistent and skilful tratment will save many of them from hopeless life-long disability. Suppose thirty of them live for forty years on the invalid pension of £1 a week. This will entail a cost to the State from the cases admitted into one hospital of over £60,000. Even from this point of view it is an important matter.

The treatment of these serious cases should be commenced at once, indeed it should never have been discontinued. The treatment will demand unremitting attention and often from a highly skilled specialist, and should be continued for at least two years. If after that period any muscles remain hopelessly paralysed the resultant crippling may sometimes be minimised by skilful surgery. It is obvious that in all but a few cases this necessarily prolonged specialist treatment can be obtained only in a hospital. However reluctant parents may be to part with their children, it is in this instance an imperative duty.

"A Nest of Cheeky Youngsters."

For the crippled child residence in hospital is no hardship. After the first week the child has become accustomed and reconciled to the immobility imposed by his splints. A child never complains as we do, of having had to lie in bed for six weeks or six months. He lives through each day as it comes, and each day suffices for itself. Whoever imagines that a cripples' ward is a sad and melancholy place has been misled by his morbid imagination. On the contrary it is a nest of cheeky youngsters, by far the happiest ward in the hospital. From each other they derive cheerful companionship, that first necessity for child happiness. They have their own amusements and laugh at their own jokes. While their bodies are being treated, their minds are not neglected. They form a school free from all punishments, but more zealous than a school of healthy children, and are taught by a State school teacher. For those who may not be able to earn their living by muscular work, a good education is of more importance than for most.

Even the most wealthy can hardly secure these advantages. What a crippled child wants is not abundant toys or rich living. Above all he does not want openly expressed sympathy or pity. He needs cheerful companionship, suitable occupation for body and mind, restoration as far as may be of his muscular power, and an uninterrupted education. There are few things more pitiable than the neglected case of paralysis developing into permanent deformity.

TO PRESERVE ORANGES.

Oranges can be preserved whole, and make a very handsome product in glass jars for purely spectacular display, but their flavour is quite insipid. Cut fruit gives a far better flavoured article. The ripe oranges are cut into V-shaped sections, with a width of about ¾ inch at the rind. After packing the cut fruit in jars fill with cool strained syrup made with 5 lb. to 6 lb. sugar to 1 gallon water. Place the jars in a cold bath, which is brought to the boil and kept boiling for five minutes. Then remove the jars. An alternative method is to cook for thirty-five minutes at a temperature of 190 deg. Fah.

Oranges so preserved can be used in salad, or if served with cream they make a very palatable sweet.

CHILDREN OF THE WEST HEALTHY ON GOATS' MILK.

"Good, rich goats' milk sticks to the children of the West as nothing else could do," the Chief Medical Officer of Health of the Department of Public Instruction (Dr. St. Vincent Welch) said recently in talking of a tour of inspection of the schools of the far North-West, from which he had just returned. The children he saw in the districts about Cloncurry, Duchess, Mount Isa, Camooweal, and Dajarra were extraordinarily healthy, except for eye troubles, he said. He attributed much of their strong and wiry condition to "the absence of a good deal of the rubbish other children get to eat." The children of the West, he said, get good, healthy food —meat, vegetables, and plenty of goats' milk.

Apparently some of the local authorities had recognised the value of the goat, both for milk and meat. At Camooweal, Urandangie, and several other places the Shire Councils had undertaken to provide blood stock of an exceptionally fine type with which to improve the goat herds of their districts. The Sinan goat, a very large, big-boned animal, had been chosen, and sires of this breed were used with considerable benefit in grading up the local herds, many of which contained 500 to 600 goats.

The goat was an exceptionally healthy animal, Dr. Welch said. It was extremely fortunate that Australia was free form the Mediterranean disease known as Malta fever, which was spread by the use of unboiled goats' milk. The germ, which caused a serious undulant fever, was conveyed to human beings from goats by the milk. It was unknown in Australia, and the importation of goats should be watched with the utmost care to keep it out of the country.

"Goat's milk is the best for 'kids'—human ones—but, unfortunately, it is hard to get in most places. Tropical children thrive on it," said Professor Osborne, of Melbourne, recently.

He made the assertion in correcting an impression that might have been gained from a recent statement he made that cows' milk helped to make Darwin children taller than in Britain. He explained that the chief reason for this contrast was the greater sunshine enjoyed by Darwin children. Cold caused the growth of children, as well as other living things, to halt in the winter. With continuous sunshine and warmth growth was continuous.

In addition to the effect of the sun on the growth of children, the quality of the milk and other food they received helped their development.

Grown in abundant sunshine the food gained more of the growth element—vitamin "B." Cows in Australia gave better milk than cows elsewhere. It contained more of vitamin "B" because the animals were exposed to the sunlight for such a great part of the year.

Cows, of course, did not do so well in the subtropical areas. The tendency was for them to be smaller and less productive.

But the children in those parts were really better served with the milk of the goat. It was all tubercle free, the goat being immune from the germ. Also it was better in other ways.

"A teaspoonful of goat's milk in a cup of tea is worth three of cow's milk, for instance," said the professor. "The goat gives more milk weight for weight than the cow."

CABBAGES.

To grow cabbages well plenty of manure should be used. There is no manure to which this crop responds so well as animal. For heavy lands horse manure, and for light soils cow or pig are respectively the best when they can be obtained. If the soil is of a poor quality, dig the ground two spits deep, and put a good layer of manure between the two spits. This is especially necessary in the case of autumn or summer crops, which have to stand a dry spell. Spring cabbage—that is, those that are planted in the autumn for use in the spring—do well if planted on ground that has been well worked and manured previously for peas or onions, and on such ground cabbages can be planted without any fresh manure being added. Of other manures lime is an important factor in successful cabbage culture; it is chemically and mechanically beneficial to the soil and the cabbage tuber. It should be applied at the rate of about 2 lb. to the square yard, and is particularly necessary to heavy soils and those rich in humus. Superphosphate at the rate of 2 oz. to the square yard is good, but should not be applied at the same time as lime or to soils that are infected with club root. When the crop is nicely established, apply 1 oz. of sulphate of ammonia to heavy, damp land, or 1 oz. of nitrate of soda per square yard in the case of light or sandy soil. Nitrate of soda is a splendid fertiliser for the cabbage family. When especially fine heads are required, water the plants once or twice during the growing season with the following mixture:—1 oz. of iron sulphate and 2 oz. of sulphate of ammonia dissolved in 1 gallon of water.

KITCHEN GARDEN.

Now is the time when the kitchen garden will richly repay all the labour bestowed upon it, for it is the month for sowing many kinds of vegetables. If the soil is not naturally rich, make it so by a liberal application of stable manure and compost. Manure for the garden during summer should be in the liquid form for preference. Failing a sufficient supply of this, artificials may be used with good results. Dig or plough the ground deeply, and afterwards keep the surface in good tilth about the crops. Water early in the morning or late in the evening, and in the latter case stir the soil early next day to prevent caking. Mulching with straw, leaves, or litter will be a great benefit as the season becomes hotter. It is a good thing to apply a little salt to newly-dug beds. What the action of salt is is not exactly known, but when it is applied as a top dressing it tends to check rank growth. A little is excellent for cabbages, and especially for asparagus, but too much renders the soil sterile and causes hardpan to form. French or kidney beans may now be sown in all parts of the State. The Lima bean delights in the hottest weather. Sow the dwarf kinds in drills 3 ft. apart and 18 in. between the plants, and the climbing sorts 6 ft. each way. Sow Guada beans, providing a trellis for them to climb on later. Sow cucumbers, melons, marrows, and squash at once. If they are troubled by the red beetle, spray with Paris green or London purple. In cool districts peas and even some beetroot may be sown. Set out egg plants in rows 4 ft. apart. Plant out tomatoes 3½ ft. each way, and train them to a single stem, either on stakes, trellis, or wire netting. Plant out rosellas. Sow mustard and cress, spinnach, lettuce, vegetable marrows, custard marrows, parsnips, carrots, chicory, eschalots, cabbage, radishes, kohl-rabi, &c. These will prove satisfactory provided the ground is well worked, kept clean, and that water, manure, and, where required, shade are provided.

THE HOME VEGETABLE GARDEN.

Fresh vegetables, especially vegetables containing vitamins, are essential to good, robust health, and medical men are now advising people to "eat more vegetables."

The growing of vegetables not only means a saving of money, but educates the children by inculcating a desire to have their own gardens in later life, and so help to keep down the costs of living.

Vegetable-growing is not only a healthy occupation, but it also provides exercise and recreation. In the suburbs it has a tendency to keep young people contented at home, and to trouble less about going to horse races and places of gambling. With country people who, perhaps, are less in need of exercise, gardening is a delightful hobby.

It enables private gardeners to improve the strains of vegetables by a careful selection of seed, much in the same way that a flockmaster improves his sheep; and much satisfaction, and, not unusually, generous reward, are to be gained from this work.

The home garden enables the testing out, in a small way, of the newer varieties of vegetables, which work is not always possible, or, if it is possible, not payable with the professional or commercial gardener. The amateur gardener will find this work both fascinating and health-giving.

Farm Notes for September.

WITH the advent of spring, cultivating implements play an important part in farming operations.

The increased warmth of soil and atmosphere is conducive to the growth of weeds of all kinds, particularly on those soils that have only received an indifferent preparation.

Potatoes planted during last month will have made their appearance above the soil, and where doubt exists as to their freedom from blight they should be sprayed with either Burgundy or Bordeaux mixture as soon as the young leaves are clear of the soil surface.

Land which has received careful initial cultivation and has a sufficiency of sub-surface moisture to permit of a satisfactory germination of seeds may be sown with maize, millets, panicum, sorghum, melons, pumpkins, cowpeas, broom millets, and crops of a like nature, provided, of course, that the areas sown are not usually subjected to late frosts.

Rhodes grass may be sown now over well-prepared surfaces of recently cleared forest lands or where early scrub burns have been obtained, and the seed is sown subsequent to showers. More rapid growths, however, are usually obtainable on areas dealt with, say, a month later.

In connection with the sowing of Rhodes grass, farmers are reminded that they have the Pure Seeds Act for their protection, and in Rhodes grass, perhaps more than any other grass, it is necessary that seed of good germination only should be sown. A sample forwarded to the Department of Agriculture will elicit the information free of cost as to whether it is worth sowing or not.

Where the conditions of rainfall are suited to its growth, paspalum may be sown this month.

The spring maize crop, always a risky one, requires to be sown on land which has received good initial cultivation and has reserves of soil moisture. Check-row seeding in this crop is to be recommended, permitting as it does right-angled and diagonal cultivation by horse implements, minimising the amount of weed growth, and at the same time obtaining a soil mulch that will, with the aid of light showers, assist to tide the plant over its critical period of "tasselling."

Although cotton may be sown this month, it usually stands a better chance if deferred until October. The harvesting of cotton during the normal rainy season is, if possible, to be avoided.

The sowing of intermediate crops prior to the preparation of land for lucerne sowing should be carried out in order that early and thorough cultivation can take place prior to the autumn sowing.

The following subsidiary crops may be sown during the month:—Tobacco and peanuts; plant sweet potatoes, arrowroot, sugar-cane, and cow cane (preferably the 90-stalked variety), and in those districts suited to their production yams and ginger. Plant out coffee.

Orchard Notes for September.

THE COASTAL DISTRICTS.

SEPTEMBER is a busy month for the fruitgrowers in the coastal districts of this State, as the returns to be obtained from the orchards, vineyards, and plantations depend very largely on the trees, vines, and other fruits getting a good start now.

In the case of citrus orchards—especially in the southern half of the State—it is certainly the most important month in the year, as the crop of fruit to be harvested during the following autumn and winter depends not only on the trees blossoming well but, what is of much more importance, that the blossoms mature properly and set a good crop of fruit.

This can only be brought about by keeping the trees healthy and in vigorous growth, as, if the trees are not in this condition, they do not possess the necessary strength to set their fruit, even though they may blossom profusely. The maintenance of the trees in a state of vigorous growth demands—first, that there is an adequate supply of moisture in the soil for the requirements of the trees; and, secondly, that there is an adequate supply of the essential plant-foods available in the soil.

With respect to the supply of moisture in the soil, this can only be secured by systematic cultivation, except in seasons of good rainfall or where there is a supply of water for irrigation. As a rule, September is a more or less dry month, and when it is dry there is little chance of securing a good crop of fruit from a neglected orchard.

If the advice that was given in the Notes for August regarding the conservation of moisture in the soil has been carried out, all that is necessary is to keep the soil stirred frequently, so as to prevent the loss of moisture by surface evaporation. If the advice has been ignored, then no time should be lost, but the soil should be brought into a state of good tilth as quickly as possible.

Where there is a supply of water available for irrigation, the trees should receive a thorough soaking if they require it. Don't wait till the trees show signs of distress, but see that they are supplied with an adequate supply of moisture during the flowering and setting periods.

It is probable that one of the chief causes why navel oranges are frequently shy bearers in the coastal districts is that the trees, though they produce a heavy crop of blossoms, are unable to set their fruit, owing to a lack of sufficient moisture in the soil at that time, as during seasons when there is a good rainfall and the trees are in vigorous growth, or where they are grown by irrigation, as a rule they bear much better crops. The importance of maintaining a good supply of moisture in the soil is thus recognised in the case of this particular variety of citrus fruit.

When the trees show the want of sufficent plant-food—a condition that is easily known by the colour of the foliage and their weakly growth—the orchard should be manured with a quick-acting, complete manure, such as a mixture of superphosphate, sulphate of ammonia, and sulphate of potash, the plant-foods which are soluble in the water contained in the soil and are thus readily taken up by the feeding roots.

Although the foregoing has been written mainly in respect of citrus orchards, it applies equally well to those in which other fruit trees are grown. Where the land has been prepared for bananas, planting should take place during the month. If the plantation is to be made on old land, then the soil should have been deeply ploughed and subsoiled and brought into a state of perfect tilth prior to planting. It should also receive a good dressing of a complete manure, so as to provide an ample supply of available plant-food. In the case of new land, which has, as a rule, been scrub that has been recently fallen and burnt off, the first operation is to dig the holes for the suckers at about 12 ft. apart each way. Good holes should be dug, and they should be deep enough to permit the top of the bulb or corm of the sucker to be 6 in. below the surface of the ground.

Care should be exercised in the selection of suckers, butts, or bits. Either of the two latter are preferable, and in the case of suckers which have broken into leaf, these should also be cut hard down to the butt. Before planting, all roots should be cut off closely and the surface pared or scraped, excepting over the buds or eyes which are allowed for development. Where the butts are split into sections (up to four) according to the number and placements of eyes, these are planted with the eye or eyes facing downwards. In the case of butts, two to three eyes are left spaced around the butt, and surplus ones being removed, the top having previously been cut down to the corm and the centre scored out. Better growth is evidenced in each case, and as no cut surface is made available (each "plant" being covered by a few inches of soil immediately) beetle-borer infestation is not shown.

In old banana plantations keep the ground well worked and free from weeds and remove all superfluous suckers; also all bases of plants which have fruited.

When necessary, manure—using a complete fertiliser rich in potash, nitrogen, and phosphoric acid, such as a mixture of meatworks manure and sulphate of potash —two of the former to one of the latter.

Pineapples can also be planted now. The ground should be thoroughly prepared —viz., brought into a state of perfect tilth to a depth of at least 1 ft.—more if possible—not scratched, as frequently happens; and when the soil requires feeding, it should be manured with a complete manure; which should, however, contain no superphosphate, bonedust or Nauru phosphate being preferable.

Old plantations should be kept in a good state of tilth and be manured with a complete fertiliser in which the phosphoric acid is in the form of bonedust, basic phosphate, or finely ground phosphatic rock, but on no account as superphosphate.

The pruning of custard apples should be carried out during the month, leaving the work, however, as late in the season as possible, as it is not advisable to encourage an early growth, which often means a production of infertile flowers. If the weather conditions are favourable passion vines can also be pruned now, as if cut back hard they will make new growth that will bear an autumn crop of fruit instead of one ripening during the summer.

Grape vines will require careful attention from the time the buds start, and they should be regularly and systematically sprayed with Bordeaux mixture from then till the time the fruit is ready to colour, in order to prevent loss by downy mildew or anthracnose. Sulphuring may be required against powdery mildew.

Where leaf-eating beetles, caterpillars, or other insects are present, the trees or plants on which they are feeding should be sprayed with arsenate of lead. All fruit-fly infested fruit must be gathered and destroyed and on no account be allowed to lie about on the ground, as, if the fly is allowed to breed unchecked at this time of the year, there is very little chance of keeping it in check later in the season.

THE GRANITE BELT, SOUTHERN AND CENTRAL TABLELANDS.

WHERE not already completed, the winter spraying with lime-sulphur should be finished as early in the month as possible. Black aphis should be fought wherever it makes its appearance by spraying with a tobacco wash, such as black-leaf forty, as if these very destructive insects are kept well in hand the young growth of flowers, leaves, wood, and fruit will have a chance to develop.

The working over of undesirable varieties of fruit trees can be continued. The pruning of grape vines should be done during the month, delaying the work as long as it is safe to do so, as the later the vines are pruned the less chance there is of their young growth being killed by late frosts. Keep the orchards well worked and free from weeds of all kinds, as the latter not only deplete the soil of moisture but also act as a harbour for many serious pests, such as the Rutherglen bug.

New vineyards can be set out, and, in order to destroy any fungus spores that may be attached to the cuttings, it is a good plan to dip them in Bordeaux mixture before planting. The land for vines should be well and deeply worked, and the cutting should be planted with one eye only out of the ground and one eye at or near the surface of the ground.

In the warmer parts, which are suitable for the growth of citrus fruits, the land must be kept well cultivated, and if the trees need irrigating they should be given a good soaking, to be followed by cultivation as soon as the land will carry a horse without packing.

In these parts fruit fly should be systematically fought, as it will probably make its appearance in late citrus fruits and loquats; and if this crop of flies is destroyed, there will be every chance of the early crops of plums, peaches, and apricots escaping without much loss.

TO SUBSCRIBERS—IMPORTANT.

Several subscriptions have been received recently under cover of unsigned letters. Obviously, in the circumstances, it is impossible to send the journal to the subscribers concerned.

It is most important that every subscriber's name and address should be written plainly, preferably in block letters, in order to avoid mistakes in addresses and delay in despatch.

CLIMATOLOGICAL TABLE—JUNE, 1932.

Supplied by the Commonwealth of Australia Meteorological Bureau, Brisbane.

Districts and Stations.	Atmospheric Pressure. Mean at 9 a.m.	Shade Temperature.						Rainfall.	
		Means.		Extremes.				Total.	Wet Days.
		Max.	Min.	Max.	Date.	Min.	Date.		
Coastal.	In.	Deg.	Deg.	Deg.		Deg.		Points.	
Cooktown	30·02	79	66	84	6	58	28	17	3
Herberton	..	71	50	78	16	30	27, 28	77	4
Rockhampton	30·09	73	52	82	3	40	21	75	7
Brisbane	30·09	68	52	77	2	42	19	60	6
Darling Downs.									
Dalby	30·13	65	41	79	2	27	19	162	7
Stanthorpe	..	57	36	70	2	18	19	80	8
Toowoomba	..	60	41	73	2	27	19	105	7
Mid-interior.									
Georgetown	30·01	82	59	88	2	41	30	0	..
Longreach	30·11	71	46	85	1	33	28	52	3
Mitchell	30·14	65	39	79	2	24	22	96	4
Western.									
Burketown	30·05	81	59	88	2, 15	45	21	0	..
Boulia	30·12	69	48	83	14	38	28, 29	103	2
Thargomindah	30·14	64	44	78	1	32	22	41	5

RAINFALL IN THE AGRICULTURAL DISTRICTS.

Table showing the Average Rainfall for the Month of June, in the Agricultural Districts, together with Total Rainfall during June, 1932, and 1931 for Comparison.

Divisions and Stations.	Average Rainfall.		Total Rainfall.		Divisions and Stations.	Average Rainfall.		Total Rainfall.	
	June.	No. of Years' Records.	June, 1932.	June, 1931.		June.	No. of Years' Records.	June, 1932.	June, 1931.
North Coast.	In.		In.	In.	*South Coast*—continued	In.		In.	In.
Atherton	1·61	31	0·83	2·05	Nambour	3·98	36	1·93	1·50
Cairns	2·86	50	0·71	5·80	Nanango	2·09	50	0·37	0·43
Cardwell	2·00	60	1·40	1·14	Rockhampton ..	2·52	45	0·75	0·37
Cooktown	2·06	53	0·17	3·34	Woodford	3·09	45	0·50	0·82
Herberton	1·04	45	0·77	1·66					
Ingham	2·33	40	0·80	1·60					
Innisfail	7·21	51	3·87	11·17					
Mossman Mill ..	2·15	19	0·75	3·95	*Darling Downs.*				
Townsville	1·30	61	0.15	0·10					
					Dalby	1·71	62	1·62	1·33
					Emu Vale	1·59	36	0·36	1·54
Central Coast.					Jimbour	1·73	44	1·61	1·13
					Miles	1·83	47	0·74	1·55
Ayr	1·42	45	0	0	Stanthorpe	1·97	59	0·80	2·05
Bowen	1·62	61	0	0	Toowoomba	2·50	60	1·05	1·40
Charters Towers ..	1·29	50	0·02	0·01	Warwick	1·80	67	0·64	1·70
Mackay	2·65	61	1·09	0·48					
Proserpine	3·39	29	0·48	0·79					
St. Lawrence ..	2·54	61	0·88	0·31					
					Maranoa.				
South Coast.					Roma	1·63	58	0·78	1·04
Biggenden	2·26	33	0·18	0·36					
Bundaberg	2·93	49	0·28	1·17					
Brisbane	2·79	81	0·60	0·57	*State Farms, &c.*				
Caboolture	2·84	45	1·00	1·14					
Childers	2.59	37	0·39	0·50	Bungeworgoral ..	1·44	18	0·68	0.87
Crohamhurst ..	4·79	39	1·71	1·19	Gatton College ..	1·95	33	1·04	0·47
Esk	2·36	45	1·23	0·38	Gindie	1·48	33	0·16	0
Gayndah	1·86	61	0·61	0·37	Hermitage	1·92	26	0·45	1·61
Gympie	2·76	62	1·08	0·69	Kairi	1·40	18	..	0·84
Kilkivan	2·18	53	0·35	0·44	Mackay Sugar Experiment Station ..	2.34	35	1·15	0·26
Maryborough ..	3·12	60	2·25	1·63					

J. H HARTSHORN, Acting Divisional Meteorologist.

ASTRONOMICAL DATA FOR QUEENSLAND.

TIMES COMPUTED BY D. EGLINTON, F.R.A.S., AND A. C. EGLINTON.

TIMES OF SUNRISE, SUNSET, AND MOONRISE.

AT WARWICK.

	August, 1932.		September. 1932.		MOONRISE. Aug., 1932.	Sept., 1932.
	Rises.	Sets.	Rises.	Sets.	Rises.	Rises.
					a.m.	a.m.
1	6·38	5·18	6·10	5·34	5·39	6·12
2	6·37	5·19	6·9	5·34	6·27	6·46
3	6·36	5·20	6·8	5·35	7·6	7·21
4	6·35	5·20	6·7	5·35	7·42	7·56
5	6·35	5·21	6·6	5·36	8·17	8·33
6	6·34	5·21	6·5	5·36	8·48	9·16
7	6·34	5·22	6·4	5·37	9·21	10·5
8	6·33	5·22	6·3	5·37	9·56	11·3
						p.m.
9	6·32	5·23	6·2	5·38	10·33	12·6
10	6·31	5·23	6·0	5·38	11·15	1·9
					p.m.	
11	6·30	5·24	5·59	5·39	12·10	2·11
12	6·29	5·24	5·58	5·39	1·9	3·15
13	6·28	5·25	5·57	5·40	2·13	4·13
14	6·27	5·25	5·56	5·40	3·17	5·10
15	6·26	5·26	5·54	5·41	4·21	6·4
16	6·26	5·26	5·53	5·41	5·25	6·57
17	6·25	5·27	5·52	5·42	6·23	7·50
18	6·24	5·27	5·51	5·42	7·19	8·46
19	6·23	5·28	5·49	5·43	8·12	9·42
20	6·22	5·28	5·48	5·43	9·5	10·37
21	6·21	5·29	5·47	5·43	10·	11·29
22	6·20	5·29	5·46	5·44	10·54	..
						a.m.
23	6·19	5·30	5·45	5·44	11·52	12·24
24	6·18	5·30	5·44	5·44	..	1·17
					a.m.	
25	6·17	5·30	5·43	5·45	12·45	2·8
26	6·16	5·31	5·42	5·45	1·41	2·52
27	6·15	5·31	5·40	5·46	2·36	3·32
28	6·14	5·32	5·39	5·46	3·28	4·8
29	6·13	5·32	5·38	5·47	4·17	4·42
30	6·12	5·33	5·37	5·47	5·0	5·17
31	6·11	5·33	..	..	5·39	..

Phases of the Moon, Occulations, &c.

2 Aug.	●	New Moon	7 41 p.m.
9 ,,	☾	First Quarter	5 40 p.m.
16 ,,	○	Full Moon	5 41 p.m.
24 ,,	☽	Last Quarter	5 21 p.m.

Perigee, 8th August, at 5·42 p.m.
Apogee, 23rd August, at 7.42 a.m.

Mercury, Venus, Mars, Jupiter, Uranus, and Neptune will be in conjunction with the Moon during the month, either below the horizon or in daylight.

Venus having left the western sky at the end of June will be a brilliant morning star, at its brightest on and near the 5th.

Mercury, being between the Earth and the Sun on the 17th, will be lost in his rays.

Venus will apparently pass right through Gemini during the month; Mars will be in Taurus till the 5th, then in Gemini till the 31st; Jupiter, in Leo from the 1st to the 31st, will be near Regulus on the 5th; Saturn in the western part of Capricornus during the whole month. The Moon will pass 4 degrees to the southward of Saturn at 10 p.m. on the 14th.

Mercury sets at 7.6 p.m. on the 1st; on the 15th it will be in inferior conjunction with the Sun.

Venus rises at 4 a.m. on the 1st, and at 3·36 a.m. on the 15th.

Mars rises at 3·55 a.m. on the 1st, and at 3·39 a.m. on the 15th.

Jupiter sets at 6.56 p.m. on the 1st, and at 6·6 p.m. on the 15th.

Saturn rises at 4.41 p.m. and sets at 6·13 a.m. on the 1st; on the 15th it rises at 3.43 p.m. and sets at 5.14 a.m.

The Moon being new on the 2nd will have its dark side to the Earth and be invisible on account of its nearness to the sun till the 4th, when a thin crescent, back downwards, may be seen in the west within an hour after sunset. It will apparently be passing through Virgo from the 5th to the 9th, through Libra on the 9th, Scorpio on the 10th, and 11th it will be in Orphineus on the 11th, Sagittarius on the 12th and 13th, Capricornus from the 14th to the 16th, Aquarius from the 16th to the 19th, Pisces on the 19th and 20th, Aries on the 22nd and 23rd, in Taurus and Auriga from the 24th to the 27th, Gemini on the 27th and 28th, in Cancer on the 29th, on the border of Cancer and Leo on the 30th, and new again on the 31st.

The Southern Cross will be at position II. at 8 p.m., III. at 10, and IV. at midnight on the 1st changing gradually to positions III., IV., and V. at the end of the month.

4 Sept.	●	New Moon	5 55 a.m.
7 ,,	☾	First Quarter	10 49 p.m.
15 ,,	○	Full Moon	7 6 a.m.
23 ,,	☽	Last Quarter	10 47 a.m.
30 ,,	●	New Moan	3 30 p.m.

Perigee, 4th September, at 4·48 a.m.
Apogee, 20th September, at 1·54 a.m.

Mercury being at its greatest elongation, 18 degrees west, on the 3rd will be visible about 14 degrees north of east, about an hour before sunrise. It will be gradually drawing nearer to the Sun till on the 29th it will be in superior conjunction with it.

For places west of Warwick and nearly in the same latitude, 28 degrees 23 minutes S. add 4 minutes for each degree of longitude. For example, at Inglewood, add 4 minutes to the times given above for Warwick; at Goondiwindi, add 8 minutes; at St. George, 14 minutes; at Cunnamulla 25 minutes; at Thargomindah, 33 minutes; and at Oontoo, 43 minutes.

The moonlight nights for each month can best be ascertained by noticing the dates when the moon will be in the first quarter and when full. In the latter case the moon will rise somewhat about the time the sun sets, and the moonlight then extends all through the night; when at the first quarter the moon rises somewhat about six hours before the sun sets, and it is moonlight only till about midnight. After full moon it will be later each evening before it rises, and when in the last quarter it will not generally rise till after midnight.

It must be remembered that the times referred to are only roughly approximate, as the relative positions of the sun and moon vary considerably.